

Exhibit 3

IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

Case No.: HC/S 26/2016

Between

ELEMENT SIX TECHNOLOGIES LIMITED
(REG NO. 08206603)

...Plaintiff(s)

And

IIa TECHNOLOGIES PTE. LTD.
(REG. NO. 200516961K)

...Defendant(s)

AFFIDAVIT

I, **SUSAN JANE FLETCHER WATTS** (United Kingdom Passport No. 099207495), care of Element Six (UK) Ltd, Global Innovation Centre, Fermi Avenue, Harwell Oxford, Didcot, Oxfordshire OX11 0QR, UK do solemnly and sincerely affirm and say as follows:-

1. I am a UK and European Patent Attorney acting as Consultant Patent Attorney (and formerly Head of Intellectual Property) for the Plaintiff and its affiliated companies in the Element Six group. I am duly authorised by the Plaintiff to make this affidavit on its behalf.

2. The matters deposed to in this affidavit, which I verily believe to be true to the best of my knowledge, information and belief, are either within my personal knowledge and/or are derived from records to which I have access.
3. This affidavit is filed in support of an application by the Plaintiff for an order for specific discovery and compliance with the electronic discovery protocol ("**Protocol**") annexed in the accompanying summons ("**Summons**").

A. BACKGROUND

(i) Events leading up to the application

4. The Plaintiff commenced the present Suit (HC/S 26/2016) against the Defendant on 12 January 2016 for infringement of Singapore Patent Nos. 115872 and 110508 (respectively the "**872 Patent**" and the "**508 Patent**", collectively the "**Patents**"). Further, as pleaded by the Plaintiff at paragraph 4 of the Particulars of Infringement (Amendment No.1) ("**POI**"), the Defendant manufactured at least 4 infringing diamond samples:
 - (a) Sample 1, which was obtained by the Plaintiff from Gemesis Diamond Company (formerly known as The Gemesis Corporation) ("**GDC**").
 - (b) Sample 2, which was obtained by the Plaintiff from Microwave Enterprises, Limited ("**ME**").
 - (c) Sample 3, which was obtained by the Plaintiff from Pure Grown Diamonds, Inc. ("**PGD**").

- (d) Sample 4, which was obtained directly from the Defendant in Singapore.
5. Although Samples 1-3 were obtained from third party retailers, there is strong evidence indicating that the Defendant had made them in Singapore. The material facts supporting these connections have already been pleaded at [4] of the POI and will also be discussed below.
 6. Samples 1-4 form an important and highly relevant part of the Plaintiff's case. The Plaintiff's position is that Samples 1 and 3 infringe various claims from the '872 Patent and the '508 Patent. In respect of Samples 2 and 4, the Plaintiff is only asserting claims from the '872 Patent.
 7. The Defendant denies any infringement of the Patents and has instituted a counterclaim alleging invalidity of the Patents.
 8. To date, the Defendant has filed one list of documents ("**DLOD**") on 7 October 2016 as well as one supplementary list of documents ("**DSLLOD**") on 16 December 2016. The DLOD and DSLLOD are annexed hereto and marked "**SFW-35**".
 9. The documents enumerated in the DLOD and DSLLOD pertain mainly to the Defendant's case on validity. The Defendant has failed to disclose any documents on *inter alia* its manufacturing process and the provenance of the Samples (save those already disclosed by the Plaintiff), notwithstanding that there is a legal obligation on the Defendant to do so.

10. The Plaintiff thus approached the Defendant for further discovery apropos documents relating to infringement. A summary of the correspondence between the parties is as follows:

- (a) By way of a letter dated 18 December 2017 (“**Discovery Letter**”) issued by the Plaintiff’s solicitors (“**AL**”) to the Defendant’s solicitors (“**DN**”), the Plaintiff made its discovery requests known to the Defendant. In particular, Annex A of the letter contains requests for 13 categories of documents and 1 request for a specific document; Annex B comprises a draft electronic discovery protocol. A deadline of 14 days (i.e. 1 January 2018) was given to the Defendant to provide its preliminary response.
- (b) By way of DN’s letter dated 22 December 2017, the Defendant sought an extension of time to 14 February 2018 to respond.
- (c) By way AL’s letter dated 26 December 2017, the Plaintiff informed the Defendant that the 6 week extension of time was not acceptable, but that a short extension of time would be given for the actual provision of the documents.
- (d) At a pre-trial conference on 27 December 2017, the learned AR Cheng Pei Feng directed the Defendant to *inter alia* file its preliminary response by 22 January 2018 and to file its list of documents by 5 February 2018.
- (e) By way of DN’s letter dated 22 January 2018, the Defendant informed the Plaintiff that:

- (i) categories 1-6 of the Discovery Letter were too broad;
 - (ii) it did not have any documents falling under categories 7, 9, 10, 11(a),(c) and (e), 12 and 13;
 - (iii) it was still taking instructions in relation to categories 8, 11(b) and (d), and 14; and
 - (iv) the Defendant objected to the electronic discovery protocol in its entirety.
- (f) By way of AL's letter dated 26 January 2018, the Plaintiff requested the Defendant to provide the following information by 5 February 2018:
- (i) its final response in relation to categories 8, 11(b) and (d), and 14; and
 - (ii) whether it was agreeable to affirming by way of an affidavit that it does not have any document under categories 7, 9, 10, 11(a),(c) and (e), 12, and 13 in its possession, custody and/or power, excluding documents that have already been disclosed in the parties' respective lists of documents and supplementary lists of documents. It is surprising that the Defendant has no documents in its possession in these categories, as these categories are typical of any materials manufacturing company, especially one that manufactures technically demanding materials such as CVD diamond.

- (g) As the Defendant failed to provide a response by 5 February 2018, the Plaintiff sent a chaser by way of AL's letter dated 6 February 2018. The Plaintiff sought a response by 4pm on 9 February 2018. No such response was received on 9 February 2018.
- (h) By way of DN's letter dated 12 February 2018, which was received by AL by fax at 5.22pm on the same day, the Defendant agreed to disclose the documents in categories 8(a)-(c) and 14. It also stated that it did not have any documents under categories 11(b) and (d), and that it was agreeable to affirming by way of an affidavit that it does not have any document under categories 7, 9, 10, 11(a), (c) and (e), 12, and 13 in its possession, custody and/or power.
- (i) By way of DN's letter to Court dated 14 February 2018, the Defendant proposed that the timelines for parties to file their respective discovery applications be postponed and dealt with at the pre-trial conference on 21 February 2018.
- (j) By way of AL's letter dated 14 February 2018, the Plaintiff requested the Defendant to affirm in an affidavit, in respect of those documents it does not have, that:
 - (i) it does not have those documents in its possession, custody and/or power;

- (ii) whether these documents have at any time been in its possession, custody and/or power; and
 - (iii) if not then in its possession, custody or power, when it parted with these categories of documents and what has become of them.
- (k) By way of DN's letter dated 20 February 2018, the Defendant disclosed copies of documents described at categories 8(a)-(c) and 14 of Annex A of the Discovery Letter. This amounted to a total of only 3 pages of documents.
- (l) At the pre-trial conference on 21 February 2018, the learned AR Cheng directed *inter alia* as follows:
- (i) Defendant to respond to AL's letter dated 14 February 2018 by 28 February 2018;
 - (ii) Plaintiff to file its application for discovery by 28 March 2018;
 - (iii) Defendant to file its reply affidavit by 11 April 2018;
 - (iv) Plaintiff to file its final response affidavit by 25 April 2018.
- (m) By way of DN's letter dated 28 February 2018, the Defendant agreed to the Plaintiff's requests in AL's letter dated 14 February 2018.
- (n) By way of AL's letter dated 2 March 2018, the Plaintiff requested the Defendant to provide the affidavit (affirming its non-possession of various

categories of documents and explanation thereof) by 13 March 2018, so that the Plaintiff could consider whether to drop some of its requests.

- (o) By way of DN's letter dated 13 March 2018, the Defendant declined to do so.

All of the relevant correspondence is annexed hereto and marked "SFW-36".

- 11. Consequently, the Plaintiff has no choice but to make this application in respect of all categories of the Discovery Letter (except for 8(a)-(c) and 14) and the Protocol. The categories of documents requested in Annex 1 of the Summons ("Categories") are similar to those in Annex A of the Discovery Letter. Annex 2 comprises the Protocol, in relation to which the Plaintiff is seeking an order for compliance.

(ii) **Explanation of document types**

- 12. To assist the Court, it is apposite at this juncture to explain some of the more technical types of documents requested in Annex 1 of the Summons. Some of the document types (e.g. marketing materials, sales invoices) are self-explanatory whereas others (e.g. material characterization analyses) would benefit from some exposition:

(a) *Process specification documents*

A process specification document sets out precise details of how a process is to be conducted in order to produce a certain product. For CVD diamond synthesis a process specification document will include parameters such as:

(i) the type of substrate and its surface preparation, (ii) the nature, concentration and flow rates of the synthesis gases, and (iii) the reactor conditions such as temperature and pressure. For post-synthesis treatments of CVD diamond, such as heat-treating (annealing) to improve colour, the process specification document would set out the annealing conditions of temperature and pressure.

(b) Material characterization analyses

Material characterization documents provide the results of test measurements made on a material sample to determine its physical characteristics. For CVD diamond, the types of characteristics measured, and therefore contained in such a document, could include photoluminescence spectroscopy indicating the synthetic nature of the material, birefringence measurements, and optical absorption measurements indicating the optical properties of the material, amongst others.

(c) Diamond grading reports/certificates

A diamond grading reports/certificate is a certificate issued by an independent Gemological Institute, such as the International Gemological Institute (“**IGI**”), providing an analysis of certain physical characteristics of a submitted diamond gemstone. The attributes listed on the certificate include carat weight, colour grade, clarity, and cut.

(d) R&D reports

R&D reports are documents used to communicate the status of a research project, together with the results obtained in accordance with the objectives to which the R&D work covered by the report relates. It is very likely that the Defendant spent some time developing its CVD diamond material and the associated manufacturing method(s) through a process of research and iteration, completing research through a systematic and iterative process of developing ideas, experimental trials and material analysis – during such projects, there would likely be periodic reports to update the relevant stakeholders (e.g. senior management,) on the status of the research.

It is possible that certain material characteristics of CVD diamond material developed through R&D and subsequently commercialized are only captured in R&D reports and not, for example, in any later product specification documents.

(e) *Laboratory notebooks*

Laboratory notebooks are essentially notes made by researchers whilst engaged in developing, conceptualizing and/or designing the Defendant's products and manufacturing methods. Such documents may include relevant details on the Defendant's product characteristics and manufacturing methods which are omitted from its product and process specifications.

(f) *Project proposals*

A project proposal sets out the objectives for a new product or manufacturing method, together with an outline of the steps to be taken and the target results. Thus a project proposal could have the objective of obtaining a CVD diamond with a higher grade of colour, and the step to be tried could be annealing. Similarly a project proposal could be to produce CVD diamond with improved optical properties, and the targeted results could be a birefringence value below a specified maximum, or a defined absorption coefficient below a specified maximum.

(g) *Project reports*

A project report provides the results and conclusions of an agreed project following a project proposal (see (f) above). Thus a project report could provide the results of material measurements for a given set of samples, such as birefringence and optical absorption.

(h) *Process revision documents*

With the level of complexity in the CVD process, and the commercial realities of sourcing all the raw materials, it is inevitable that the Defendant's manufacturing process(es) will have gone through a number of iteration before a final process(es) was settled on. Process revision documents set out the changes made to a prior iteration so as to achieve the subsequent iteration of a particular manufacturing process, and can give further insight into the manufacturing conditions employed.

(i) *Product development reviews*

With the level of complexity in the CVD process, and the commercial realities of sourcing all the raw materials, it is inevitable that the Defendant's manufacturing process(es) will have gone through a number of iteration before a final process(es) was settled on. The testing of each iteration of its process would involve the review of diamond material produced by each iteration. The purpose of such reviews (i.e. product development reviews) would *inter alia* be to assess whether the diamond material meets the Defendant's objectives.

(j) *Product specification documents*

A product specification document provides detailed information on the characteristics of a specified diamond material (which could include, for example, optical absorption, birefringence, dimensions, etc.) that must be met in order for the product to be considered acceptable as saleable product and meet customer expectations.

(k) *CVD synthesis run sheets*

CVD synthesis run sheets record the specific parameters (e.g. composition of synthesis atmosphere, temperature, substrate preparation) that were planned to be used to create a particular batch of material, together with any procedures for verifying calibration etc., and records measurements made

during the process to confirm conformance to plan or record any deviation from it.

(l) *Quality control records*

Quality control records are an intrinsic part of any commercial production process. They document both process parameters and measurements made on the product itself which are deemed important in ensuring the product and process are running to specification. Quality control records often cover properties of intermediate products (such as colour before annealing), or additional properties of the product not in the product specification but which are used internally to assist in monitoring and maintaining a stable production process.

(m) *Documents specifying surface preparation of substrates pre-synthesis, and any subsequent characterization*

A substrate in the present context is a base upon which the CVD diamond material is grown. During the CVD synthesis process, the substrate is placed in a chamber wherein carbon atoms that have been created in the form of a plasma in the chamber, deposit on to the substrate such that diamond is grown layer by layer. The surface smoothness of the substrate is critical for minimizing the structural defects that can occur in the diamond as it grows. Thus any documents that specify the way in which the substrate surface is prepared prior to diamond growth are relevant. Any such document may form part of the process specification for the diamond material, but equally

may be a separately stored document. Some of the claims of the Patents relate to the use of substrates having certain characteristics pre-synthesis. Documents specifying the substrates used by the Defendant in its process(es) would thus be relevant.

- (n) *Documents specifying the level of nitrogen in the synthesis atmosphere and the method by which this is controlled*

The synthesis atmosphere refers to the composition of gases in the chamber during the CVD synthesis process. The synthesis atmosphere typically includes methane, hydrogen and nitrogen at varying proportions.

Some of the method claims of the Patents relate to the use of a synthesis atmosphere having a very specific proportion of nitrogen, wherein the nitrogen level is calculated to a particular degree of accuracy. Documents specifying the level of nitrogen in the synthesis atmosphere and the method by which this is controlled would thus be relevant to ascertaining whether there is infringement.

B. SAMPLES

13. At this juncture, it is apposite to discuss the relevance of the Samples to the Plaintiff's case on infringement. Each of the Samples infringe one or more of the Patents, and there are strong connections linking each Sample back to the Defendant. The Protocol and all of the Categories are connected to and/or justified by, whether directly or indirectly, the Samples. For example, Categories 5-6 relate to the

Defendant's process for annealing. These are derived from the fact that Samples 1 and 3 have been annealed and therefore infringe the '508 Patent.

14. I will address each Sample *seriatim*.

(i) **Sample 1**

Sample 1 infringes the Patents

15. Sample 1 has been analyzed by the Plaintiff extensively to ascertain whether and which claims of the Patents it infringes. The results of these tests show conclusively that Sample 1 infringes the asserted claims of the '872 Patent and the '508 Patent. A summary of the Plaintiff's findings can be found in three technical reports titled "Analysis of Gemesis Gemstone NL530", "Summary of Evidence that NL530 had been Heat Treated (Annealed) after Growth" and "Summary of evidence that NL530 was Coloured Prior to Annealing", which are exhibited hereto as part of "SFW-37" (i.e. SFW-37(a)-(c) respectively). It should be noted that 'NL530' is the internal code assigned to Sample 1 by the Plaintiff.

16. In the interest of brevity, I will illustrate the infringing nature of Sample 1 by going through the technical findings in respect of an independent claim of the '872 Patent (i.e. Claim 1(ii)) and the main independent claim of the 508' Patent (i.e. Claim 1). To be clear, Sample 1 also infringes the other asserted claims of the Patents; however, it is not necessary to go through each of these for the purposes of the present discovery application.

17. Claim 1(ii) of the '872 Patent is as follows:

A CVD single crystal diamond material which shows at least one of the following characteristics, when measured at room temperature (nominally 20°C):

...

ii) a low optical birefringence, indicative of low strain, such that in a sample of a specified thickness of at least 0.5 mm and measured in a manner described herein over a specified area of at least 1.3 mm x 1.3 mm, the modulus of the sine of the phase shift, $|\sin \delta|$, for at least 98% of the analysed area of the sample remains in the first order (δ does not exceed $\pi/2$) and the $|\sin \delta|$ does not exceed 0.9;

...

18. Upon testing, Sample 1 had the following maximum values for $|\sin \delta|$ ¹:

Dimension of selected area (mm)	$\sin \delta_{\max}$ (for 100% of the analysed area)	$\sin \delta_{\max}$ (for 99% of the analysed area)	$\sin \delta_{\max}$ (for 98% of the analysed area)
1.3 x 1.3	0.352	0.302	0.291
2.5 x 2.5	0.573	0.427	0.412

19. $|\sin \delta|$ does not exceed 0.573, which is well within the 0.9 threshold of Claim 1(ii).

It follows that there is strong evidence that Sample 1 infringes the '872 Patent.

20. Moving to the '508 Patent, Claim 1 thereof is as follows:

¹ SFW-37(a) at pp. 16-17

A method of producing single crystal CVD diamond of a desired colour includes the steps of providing single crystal CVD diamond which is coloured and heat treating the diamond under conditions suitable to produce the desired colour.

21. Various tests carried out on Sample 1, which were compared with the results of similar tests on other CVD diamond samples known to be annealed or not annealed, suggest that Sample 1 was subject to heat treatment²:

- (a) Absorption spectroscopy and photoluminescence spectroscopy tests suggest that Sample 1 was annealed in the 1900-2300°C range.
- (b) DiamondView analysis of Sample 1 shows a blue phosphorescence which indicates annealing in this particular instance.

22. The fact that Sample 1 was annealed is strong evidence that it was coloured (i.e. not colourless) prior to heat treatment. This was discussed in “Summary of evidence that NL530 was Coloured Prior to Annealing”³, which was authored by the DeBeers Head of Physics Dr Philip Martineau. I agree with his analysis. He observed as follows:

“NL530 was given an F colour grade by IGI. This is within the range of colour grades (D, E, F) covering stones that are categorized as colourless. It is now well known that it is possible to change the colour of brown as-grown CVD synthetic diamond to more desirable colours by heat treatment (annealing) but that such annealing has no significant effect for CVD

² SFW-37(b)

³ SFW-37(c)

synthetic diamond material that is already colourless. The evidence that NL530 had been annealed is very strong and the author cannot think of any other credible reason why such annealing should have been carried out in this case other than to change the colour of the material. The fact that it was colourless after annealing therefore points to its having been coloured before annealing.”

Connection between Sample 1 and the Defendant

23. Sample 1 was purchased from GDC via their website at www.gemesis.com by a Mr. Chuiguan Ng in or around April 2012. Said purchase was made by private investigators under instructions by the Plaintiff’s Singapore counsel (i.e. AL).
24. The purchase is evidenced by *inter alia* invoice number INV-REF/01-JAN-12/31 dated 16 April 2012, which identifies Sample 1 with the product code “LG10061905”. This product code appears to be based on the accompanying IGI report, which has a report number identical to the product code (i.e. LG10061905). The documents pertaining to this trap purchase are exhibited hereto as part of “SFW-37” (i.e. SFW-37(d)-(i)).
25. By way of background, IGI is an independent diamond and jewelry certification organization, which operates the largest gemological laboratory worldwide. In the industry, it is typical for gemstones to be accompanied by independent certification (such as an IGI certificate), so that both the buyer and seller can have confidence as to the characteristics of the specified gemstone.

26. Based on IGI report no. LG10061905, Sample 1 has the following characteristics:
- (a) Carat weight: 0.40 ct
 - (b) Colour grade: F
 - (c) Clarity grade: VS2
27. There is strong evidence that Sample 1 was made from CVD diamond material synthesized by the Defendant in Singapore, including but not limited to:
- (a) From 16 April 2013 or earlier to at least 24 March 2016, the website of the Defendant at <http://2atechnologies.com/2a-diamond-properties/gem-quality-diamonds/> stated that “Jewellery using diamonds grown by Ila Technologies are available through our partner Gemesis at www.gemesis.com.”
 - (b) The invoice issued by GDC for Sample 1 (Invoice number INV-REF/01-JAN-12/31 dated 16 Apr 2012) lists GDC as the vendor and www.gemesis.com as the contact email.
 - (c) At least as of 24 March 2016, the website of GDC, www.gemesis.com, redirects to the website of PGD, www.puregrowndiamonds.com. Both the Defendant and PGD are part of the Ila Holdings Group, as admitted by the Defendant at [4] of the Defence and Counterclaim (Amendment No.3) (“DCC”).

- (d) Both GDC and the Defendant are owned/controlled by the Mehta family. The CEO of the Defendant is Mehta Vishal Jatin. As stated in an article entitled “The Mystery of Two Gemesis Companies Under One Hat” by Chaim Even-Zohar, Jatin R. Mehta acquired a controlling interest in GDC through his son, Vishal.
- (e) As stated in an 11 October 2012 article entitled “Jatin Mehta: New Global Gem-Quality Synthetic Diamond Czar”, in January 2010, members of the Mehta family, amongst others, acquired 50.1% of GDC.
- (f) In a 3 April 2013 article entitled “The New Lab-Grown Diamond Company That Doesn’t Seem All That New”, the writer observes that there are several connections between the Defendant and “Gemesis Corp.” (i.e. GDC, as it was formerly known as The Gemesis Corporation), for example the fact that the “IIa logo” is the same as the insignia that can be seen on the website <http://gemesis.com>.
- (g) There is nothing to indicate that GDC obtained its products from any supplier other than the Defendant. Indeed, the Defendant has not raised any facts that would suggest GDC has more than one supplier.

The documents referred to and supporting the facts above are annexed hereto and marked “SFW-38”.

28. In light of the above, it is very likely that Sample 1 originated from the Defendant in Singapore and that there is some commercial relationship (whether formal or informal) between the Defendant and GDC.

(ii) **Sample 2**

Sample 2 infringes the ‘872 Patent

29. Sample 2 has been analysed by the Plaintiff extensively to ascertain whether and which claims of the Patents it infringes. The results of these tests show conclusively that Sample 2 infringes the asserted claims of the ‘872 Patent. A summary of the Plaintiff’s findings can be found in the technical report titled “Characterisation of an optical grade single crystal synthetic diamond sample (NL625-03) supplied by Microwave Enterprises” and dated 5 October 2016, which is exhibited hereto as part of “**SFW-39**” (i.e. SFW-39(a)). It should be noted that ‘NL625-03’ is the internal code assigned to Sample 2 by the Plaintiff.
30. In the interest of brevity, I will illustrate the infringing nature of Sample 2 by going through the technical findings in respect of Claim 1(ii) of the ‘872 Patent.
31. Upon testing, Sample 2 had the following maximum values for $|\sin \delta|^4$:

Dimension of selected area (mm)	$\sin \delta_{\max}$ (for 100% of the	$\sin \delta_{\max}$ (for 99% of the	$\sin \delta_{\max}$ (for 98% of the
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⁴ SFW-39(a) at p. 8

	analysed area)	analysed area)	analysed area)
1.3 x 1.3	0.548	0.442	0.407
2.5 x 2.5	0.834	0.628	0.588

32. $|\sin \delta|$ does not exceed 0.834, which is well within the 0.9 threshold of Claim 1(ii).

It follows that there is strong evidence that Sample 2 infringes the '872 Patent.

Connection between Sample 2 and the Defendant

33. Sample 2 was purchased from ME in or around May 2014 by a contact of the Plaintiff. Said purchase was made under instructions by the Plaintiff.
34. The purchase is evidenced by *inter alia* ME quote no. 13-2051 dated 24 February 2014 and ME invoice no. 3086. The aforementioned quote and invoice list several product codes; as pleaded in the POI at [4(a)(ii)(D)], Sample 2 is one of the listed diamond plates and has product code 2PCVD303004N. The documents pertaining to this trap purchase are exhibited hereto as part of “**SFW-39**” (i.e. SFW-39(b)-(l)).
35. There is strong evidence that Sample 2 was made from CVD diamond material synthesized by the Defendant in Singapore, including but not limited to:
- (a) ME quote no. 13-2051 expressly states that: “*The following quotation is for Lab Grown, CVD single crystal diamond plates, produced by [the Defendant].*”
 - (b) ME quote no. 13-2051 references “IIa Quote #: 1314-121”. IIa quote no. 1314-121, which the Defendant recently disclosed to the Plaintiff, is a

quotation issued by the Defendant to ME in relation to various diamond plates, one of which is Sample 2 (i.e. having code 2PCVD303004N).

- (c) Item code 2PCVD303004N is further referenced in the Defendant's invoice to ME (invoice no. IIA/INV/1415-047 dated 6 June 2014) and ME's purchase order issued to the Defendant (purchase order no. 855 dated 7 May 2014).
- (d) At the time of filing the Suit, the main website of ME at www.mwe-ltd.com contained numerous references that its CVD diamond material was synthesized by the Defendant in Singapore, including the following⁵:

“Our manufacturing partner is the industry leader in grown diamond technology and manufacturing capability, Ila Technologies Pte Ltd, located in Singapore.”

“[ME] provides the US market with CVD diamond material produced by Ila Technologies, Pte [sic]. Ila Technologies host the largest CVD diamond manufacturing facility in the world, where they have transitioned from producing type Ila rough diamond for the gem market to similar material, produced and finished for the industrial and scientific communities.”

“In 2013, the company teamed with one of our customers and the largest producer of lab grown diamond materials in the world, Ila

⁵ See SFW-39(h)

Technologies. Under the collaboration, [ME] now distributes and sells lab grown diamond materials in the North American market place.”

- (e) The product code of Sample 2 (2PCVD303004N) has an identical format to the product code for Sample 4 (2PCVD505005N) which was obtained directly from the Defendant (see below).
 - (f) In a 2013 PowerPoint presentation by Diamtec GmbH, the European office of the Defendant, ME is listed as the American headquarters for the Defendant.
 - (g) In 2 February 2015 article entitled “Synthetic Diamond Producer Creates Trade Representative Body Prohibits the Use of the ‘S’-Word”, the writer notes that Diamtec GmbH’s business development director confirmed that ME was acquired by the Defendant. In an interview published on 26 February 2016, the CEO of ME (Richard Garard) clarified that there was a very close relationship between ME and the Defendant, albeit no ownership.
36. In light of the above, it is very likely that Sample 2 originated from the Defendant in Singapore and that there is some commercial relationship (whether formal or informal) between the Defendant and ME.

(iii) **Sample 3**

Sample 3 infringes the Patents

37. Sample 3 has been analysed by the Plaintiff extensively to ascertain whether and which claims of the Patents it infringes. The results of these tests show conclusively that Sample 3 infringes the asserted claims of the ‘872 Patent and the ‘508 Patent. A summary of the Plaintiff’s findings can be found in the technical reports titled “Analysis of Pure Grown Diamonds Gemstone NL702”, “Summary of Evidence that NL702 had been Heat Treated (Annealed) after Growth” and “Summary of Evidence that NL702 was Coloured Prior to Annealing”, which are exhibited hereto as part of “SFW-40” (i.e. SFW-40(a)-(c) respectively). It should be noted that ‘NL702’ is the internal code assigned to Sample 3 by the Plaintiff.
38. In the interest of brevity, I will illustrate the infringing nature of Sample 3 by going through the technical findings in respect Claim 1(ii) of the ‘872 Patent and Claim 1 of the 508’ Patent. To be clear, Sample 3 also infringes the other asserted claims of the Patents; however, it is not necessary to go through each of these for the purposes of the present discovery application.
39. I will first address Claim 1(ii) of the ‘872 Patent. Upon testing, Sample 3 had the following maximum values for $|\sin \delta|$ ⁶:

Dimension of selected area (mm)	$\sin \delta_{\max}$ (for 100% of the analysed area)	$\sin \delta_{\max}$ (for 99% of the analysed area)	$\sin \delta_{\max}$ (for 98% of the analysed area)
1.3 x 1.3	0.141	0.085	0.080
2.5 x 2.5	0.447	0.106	0.101

⁶ SFW-40(a) at p. 9

40. $|\sin \delta|$ does not exceed 0.447, which is well within the 0.9 threshold of Claim 1(ii).

It follows that there is strong evidence that Sample 3 infringes the '872 Patent.

41. I will now move on to Claim 1 of the '508 Patent. The tests carried out on Sample 3, which were compared with the results of similar tests on other CVD diamond samples known to be annealed or not annealed, suggest that Sample 3 was subject to heat treatment⁷:

- (a) Absorption spectroscopy and photoluminescence spectroscopy tests suggest that Sample 3 was annealed in the 1900-2300°C range.
- (b) DiamondView analysis of Sample 3 shows a blue phosphorescence which indicates annealing.

42. The fact that Sample 3 was annealed is strong evidence that it was coloured (i.e. not colourless) prior to heat treatment. This was discussed in "Summary of Evidence that NL702 was Coloured Prior to Annealing"⁸, which was also authored by Dr Philip Martineau. I agree with his analysis. He observed as follows:

"NL702 was given a K colour grade by IGI. This is within the range of colour grades covering stones that are categorized as near-colourless. It is now well known that it is possible to change the colour of brown as-grown CVD synthetic diamond to more desirable colours by heat treatment (annealing) but that such annealing has no significant effect for CVD synthetic diamond

⁷ SFW-40(b)

⁸ SFW-40(c)

material that is already colourless. The evidence that NL702 had been annealed is very strong and the author cannot think of any other credible reason why such annealing should have been carried out in this case other than to improve the colour of the material. The fact that it was near-colourless after annealing therefore points to its having been coloured before annealing.”

Connection between Sample 3 and the Defendant

43. Sample 3 was purchased from the US company PGD in or around October 2015 by a contact of the Plaintiff. Said purchase was made under instructions by the Plaintiff.
44. The purchase is evidenced by *inter alia* PGD invoice no. SA-1510-00178 dated 27 October 2015 and IGI report no. LG10226420. Two gemstones were purchased pursuant to this transaction, i.e. “LG10226420” and “LG10172714”. These codes are IGI report numbers. As pleaded in the POI at [4(a)(iii)], Sample 3 is the gemstone that is the subject of IGI report no. LG10226420. The documents pertaining to this trap purchase are exhibited hereto as part of “**SFW-40**” (i.e. SFW-40(d)-(h)).
45. Based on IGI report no. LG10226420, Sample 3 has the following characteristics:
 - (a) Carat weight: 0.38 ct
 - (b) Colour grade: K
 - (c) Clarity grade: VS1

46. There is strong evidence that Sample 3 was made from CVD diamond material synthesized by the Defendant in Singapore, including but not limited to:
- (a) PGD and the Defendant are both owned and controlled by the Mehta family. From 26 February 2014 or earlier up to as late as 6 January 2015, Suraj Mehta was the sole director of PGD (then known as Gemesis, Inc.). This is evidenced by the 2013 and 2014 Annual Franchise Tax Reports for PGD. In the 2013 report (which was filed on 26 February 2014), Suraj Mehta is listed as the sole director. In the 2014 report (which was filed on 7 January 2015), Teresa Tongson is listed as the sole director. Another member of the Mehta family, Mehta Vishal Jatin, is currently the CEO of the Defendant.
 - (b) As admitted by the Defendant at [4] of the DCC, the Defendant and PGD are both part of the Ila Holdings Group.
 - (c) The official Facebook page of the Defendant at <https://www.facebook.com/IlaTech/> actively advertises for and runs articles on PGD.
 - (d) In an article dated 23 December 2014 entitled “S’pore firm shines with lab-grown diamonds”, PGD is stated to be the sister company of the Defendant.
 - (e) In an article dated 11 February 2015 and entitled “MetroWest Jewelry Store Selling Lab Grown Diamonds”, PGD is stated to create its diamonds in a Singapore lab.

- (f) In an article dated 17 March 2015 and entitled “Ila Technologies Unveils World’s Largest Diamond Greenhouse in Singapore”, as well as an article dated 19 March 2015 and entitled “World’s largest diamond factory opens in Singapore”, PGD is stated to be a “part of Ila Holdings Group”. The Defendant is also stated to be a part of “Ila Holdings Group”.

The documents referred to and supporting the facts above are annexed hereto and marked “SFW-41”.

47. In light of the above, it is very likely that Sample 3 originated from the Defendant in Singapore and that there is some commercial relationship (whether formal or informal) between the Defendant and PGD.

(iv) **Sample 4**

Sample 4 infringes the ‘872 Patent

48. Sample 4 has been analysed by the Plaintiff extensively to ascertain whether and which claims of the Patents it infringes. The results of these tests show conclusively that Sample 4 infringes the asserted claims of the ‘872 Patent. A summary of the Plaintiff’s findings can be found in the technical report titled “Characterisation of an optical grade single crystal CVD synthetic diamond sample (NL719-06) supplied by Ila Technologies Pte Ltd” and dated 5 October 2016, which is exhibited hereto as part of “SFW-42” (i.e. SFW-42(a)). It should be noted that ‘NL719-06’ is the internal code assigned to Sample 4 by the Plaintiff.

49. In the interest of brevity, I will illustrate the infringing nature of Sample 4 by going through the technical findings in respect of Claim 1(ii) of the ‘872 Patent.

50. Upon testing, Sample 4 had the following maximum values for $|\sin \delta|$ ⁹:

Dimension of selected area (mm)	$\sin \delta_{\max}$ (for 100% of the analysed area)	$\sin \delta_{\max}$ (for 99% of the analysed area)	$\sin \delta_{\max}$ (for 98% of the analysed area)
1.3 x 1.3	0.317	0.246	0.231
2.5 x 2.5	0.568	0.482	0.302

51. $|\sin \delta|$ does not exceed 0.568, which is well within the 0.9 threshold of Claim 1(ii).

It follows that there is strong evidence that Sample 4 infringes the ‘872 Patent.

52. As an aside, I note that there are some typographical errors in “Characterisation of an optical grade single crystal CVD synthetic diamond sample (NL719-06) supplied by Ila Technologies Pte Ltd” at Section 7 paragraph 2 relating to UV/visible absorption spectroscopy measurements, but this is immaterial to the discussion above and the infringing nature of Sample 4. In any event, the Plaintiff has informed the Defendant of this error and of its intention to disclose a revised technical report.

Connection between Sample 4 and the Defendant

53. Sample 4 was purchased directly from the Defendant in or around October 2015 by a Mr. Pascal Pierra, who is a contact of the Plaintiff. Said purchase was made under instructions by the Plaintiff.

⁹ SFW-42(a) at p. 8

54. The purchase is evidenced by *inter alia* Ila quote no. Ila/QT/1516-124 dated 23 October 2015, delivery order no. Ila/DO/1516-0241 and Ila invoice no. Ila/INV/1516-124. The aforementioned documents list several product codes; as pleaded in the POI at [4(a)(iv)], Sample 4 is one of the listed diamond plates and has product code 2PCVD505005N. The documents pertaining to this trap purchase are exhibited hereto as part of “**SFW-42**” (i.e. SFW-42(b)-(f)).

C. **DIAMOND CHARACTERISATION CATEGORIES**

55. Categories 1-4 of Annex 1 can be termed the “Diamond Characterisation Categories” as they relate to the determination of various physical characteristics of diamond material:

- (a) Category 1 relates to the determination of birefringence per Claim 1(ii) of the ‘872 Patent;
- (b) Category 2 relates to the determination of birefringence per Claim 1(iii) of the ‘872 Patent;
- (c) Category 3 relates to the determination of optical absorption per Claim 16(ii) of the ‘872 Patent;
- (d) Category 4 relates to the determination of nitrogen concentration in single substitutional form per Claims 57-59 of the ‘872 Patent.

(i) **Relevance**

56. I will address the relevance of each Category *seriatim*.

Categories 1-2

57. Claims 1(ii) and 1(iii) of the '872 Patent, which are two of the claims that have been asserted against the Defendant, are as follows:

1. A CVD single crystal diamond material which shows at least one of the following characteristics, when measured at room temperature (nominally 20 °C):

...

(ii) a low optical birefringence, indicative of low strain, such that in a sample of a specified thickness of at least 0.5mm and measured in a manner described herein over a specified area of at least 1.3 mm x 1.3 mm, the modulus of the sine of the phase shift, $|\sin \delta|$, for at least 98% of the analysed area of the sample remains in the first order (δ does not exceed $\pi/2$) and the $|\sin \delta|$ does not exceed 0.9;

(iii) a low optical birefringence, indicative of low strain, such that in a sample of a specified thickness of at least 0.5 mm and measured in a manner described herein over a specified area of at least 1.3 mm x 1.3 mm, for 100% of the area analysed, the sample remains in first order (δ does not exceed $\pi/2$), and the maximum value of $\Delta n_{[\text{average}]}$, the average value of the difference between the refractive index for light polarised parallel to the slow and fast axes averaged over the sample thickness, does not exceed 1.5×10^{-4} ;

...

58. It is apparent from the above that Claims 1(ii) and 1(iii) claim diamond material that have specified low birefringence values.
59. Categories 1-2 seek documents relating to the measurement of birefringence of diamond material made by the Defendant in Singapore. Where possible and appropriate, the Plaintiff has tailored the scope of these Categories to match the scope of Claims 1(ii) and 1(iii), such that only documents on infringing material are caught. Notably, Category 1 only encompasses single crystal CVD diamond material that has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm and an optical birefringence such that $|\sin \delta|$ does not exceed 0.9 (i.e. the range claimed by Claim 1(ii)). In the same vein, Category 2 only encompasses single crystal CVD diamond material that has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm and an optical birefringence such that the maximum value of $\Delta n_{[\text{average}]}$ does not exceed 1.5×10^{-4} (i.e. the upper limit claimed by Claim 1(iii)).
60. In the premises, it is plain that Categories 1-2 relate solely to documents on infringing diamond material made by the Defendant in Singapore. Said diamond material would include one or more of the pleaded Samples and/or other infringing material – as discussed in Section B, Samples 1-4 all fall within the claimed birefringence values. Categories 1-2 are therefore highly relevant and necessary.

Category 3

61. Claim 16(ii) of the '872 Patent is as follows:

16. A CVD single crystal diamond material according to any one of the preceding claims which shows at least one of the following characteristics, when measured at room temperature (nominally 20°C):

...

- (ii) a low and uniform optical absorption such that a sample of a specified thickness of at least 0.5 mm has an optical absorption coefficient at a wavelength of 1.06 μm of less than 0.09 cm^{-1} ;

...

- 62. It is apparent from the above that Claim 16(ii) claims diamond material that has an optical absorption coefficient at defined wavelength that is below a specified value.
- 63. Category 3 seeks documents relating to the measurement of optical absorption of diamond material made by the Defendant in Singapore. Where possible and appropriate, the Plaintiff has tailored the scope of this Category to match the scope of Claim 16(ii), such that only documents on infringing material are caught.
- 64. Notably, Category 3 only encompasses single crystal CVD diamond material that has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm and an optical absorption coefficient of less than 0.09 cm^{-1} wherein the measurement was made at a wavelength of 1.06 μm .
- 65. Additionally, I observe that Claim 16(ii) is a dependent claim as it can rely on “any one of the preceding claims”. Regardless of how the dependency is constructed, Claim 16(ii) would ultimately rely on Claim 1, being the preceding independent

claim. This constraint is reflected in Category 3, which asks only for documents relating to the diamond material identified in Categories 1 or 2.

66. In the premises, it is plain that Category 3 relates solely to documents on infringing diamond material made by the Defendant in Singapore. Said diamond material would include one or more of the pleaded Samples and/or other infringing material – as discussed in the technical reports, Samples 1-4 all have optical absorption coefficients that fall within the scope of Claim 16(ii)¹⁰. Category 3 is therefore highly relevant and necessary.

Category 4

67. Claims 57-59 of the '872 Patent are as follows:

57. A CVD single crystal diamond material according to any one of the preceding claims, which contains less than 5×10^{17} atoms/cm³ N in single substitutional form as measured by EPR.

58. A CVD single crystal diamond material according to claim 57, which contains less than 2×10^{17} atoms/cm³ N in single substitutional form as measured by EPR.

59. A CVD single crystal diamond material according to any one of the preceding claims, which contains more than 3×10^{15} atoms/cm³ N in single substitutional form as measured by EPR.

¹⁰ See SFW-37(a) at p.1, SFW-39(a) at p.1, SFW-40(a) at p.1, SFW-42(a) at p.1

68. It is apparent from the above that Claims 57-59 claim diamond material that falls within specified ranges of single substitutional nitrogen concentration. In drafting Category 4, I have condensed these ranges into a single narrower range (*viz*, more than 3×10^{15} atoms/cm³ N but less than 5×10^{17} atoms/cm³ N) for the Defendant's convenience.
69. Category 4 seeks documents relating to the measurement of single substitutional nitrogen concentration of single crystal CVD diamond material made by the Defendant in Singapore. Where possible and appropriate, the Plaintiff has tailored the scope of this Category to match the scope of Claims 57-59, such that only documents on infringing material are caught.
70. Notably, Category 4 only encompasses single crystal CVD diamond material that has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm and where the measured material contains more than 3×10^{15} atoms/cm³ N but less than 5×10^{17} atoms/cm³ N in single substitutional form as measured by EPR.
71. Additionally, I observe that Claims 57-59 are dependent claims. Regardless of how the dependency is constructed, Claims 57-59 would ultimately rely on Claim 1, being the preceding independent claim. This constraint is reflected in Category 4, which asks only for documents relating to the diamond material identified in Categories 1 or 2.
72. In the premises, it is plain that Category 4 relates solely to documents on infringing diamond material made by the Defendant in Singapore. Said diamond material would include one or more of the pleaded Samples – as discussed in the technical

reports, Samples 1-4 all have single substitutional nitrogen concentrations that fall within the scope of the range in Category 4¹¹. Category 4 is therefore highly relevant and necessary.

(ii) Requested document types

73. For each of Categories 1-4, the Plaintiff is only asking for the following document types:

- (a) R&D reports;
- (b) Material characterization analyses; and
- (c) Quality control records.

74. As regards (a), it is very likely that the Defendant spent some time developing its processes for manufacturing CVD diamond material. During this development process, the Defendant would have measured multiple ‘test’ diamonds for various qualities.

75. Whether the intended use of the CVD single crystal diamond material was for industrial optical applications or for gemstones, the Defendant would have the objective of producing appropriate quality diamond material within acceptable commercial yields and cost. It is therefore very likely that the Defendant measured characteristics such as synthesis nitrogen concentration, optical absorption and

¹¹ See SFW-37(a) at p.15, SFW-39(a) at p.6, SFW-40(a) at p.9, SFW-42(a) at p.5

birefringence, and colour, amongst other properties, in the course of its development processes.

76. As regards (b), material characterization analyses would provide information on the physical properties of specified diamond material. Upon obtaining these documents, the Plaintiff would be able to compare the physical properties of the pleaded Samples with the physical properties of the diamond material analyzed in the disclosed documents. If there is a match between a pleaded Sample and one of the diamond materials analyzed in the disclosed documents, this will be very strong evidence that a pleaded Sample was made by the Defendant. Even if there is no match, this would suggest that the disclosed documents relate to other infringing material and would still be highly relevant.

77. As regards (c), quality control records would be another highly relevant type of document. Quality control records would show the measured characteristics of diamond material produced from the Defendant's commercial production runs. It may very well be that Samples 1-4 will have been made from one of the CVD production runs for which there are quality control records.

78. Consequently, these documents would be very relevant to the Plaintiff's case on infringement vis-à-vis the Samples. Additionally, they would also go towards the issue of whether the Defendant has infringed the asserted process claims.

(iii) **Documents are in Defendant's possession, power or custody**

79. The Defendant is in the business of developing and producing CVD single crystal diamond material and as such it is expected that it will have the types of documents set out in Categories 1-4. Indeed it is difficult to contemplate how any company that develops and manufactures a technically complex and challenging material such as synthetic diamond could operate without such records.
80. If the Defendant no longer has any of the documents under Categories 1-4 in its possession, custody or power, the Defendant must state whether they have at any time been in its possession, custody or power, and if not now in its possession, custody or power, when it parted with them and what has become of them.

D. PROCESS CATEGORIES

(i) Relevance

Categories 5-6

81. Categories 5-6 of Annex 1 can be regarded as relating to the asserted process claims of the '508 Patent. These Categories essentially require the Defendant to disclose documents on its method(s) of heat treating single crystal CVD diamond material at or above 1200 °C. Preliminarily, I would highlight that the 1200 °C limitation is to ensure that the Categories do not cover irrelevant documents. Here the Plaintiff is only searching for documents relating to post-CVD synthesis treatments. The temperature limitation should make it easier to identify such documents.

82. It will be recalled that the '508 Patent concerns a method of producing CVD diamond of a desired colour including the steps of heat treating the diamond under conditions suitable to produce the desired colour. Presently, as pleaded in the SOC, the Plaintiff is asserting Claims 1-3, 5-10, 12-18, 24-25, 38-41 and 44-45 of the '508 Patent.

83. The main independent claim of the '508 Patent, Claim 1, is as follows:

A method of producing single crystal CVD diamond of a desired colour includes the steps of providing single crystal CVD diamond which is coloured and heat treating the diamond under conditions suitable to produce the desired colour.

84. Apart from Claim 1, the other asserted claims of the '508 Patent can be regarded as 'dependent' claims. These claims ultimately refer back to the independent Claim 1 and incorporate all its features. On a general level, a dependent claim may serve a variety of objectives. For example, the dependent claim may add a new or extra feature that was not set out in the previous claim at all. Alternatively, it may be that the dependent claim simply serves to limit or restrict the scope of an element referred to in the preceding claim.

85. Here, Claim 1 of the '508 Patent and all of its asserted dependent claims relate to the heat treatment of single crystal CVD diamond. When considering whether any asserted claims of the '508 Patent has been infringed, the Defendant's post synthesis treatment of heating (or 'annealing') single crystal CVD diamond therefore becomes highly relevant.

86. In section B(i) and (iii) above, I discussed how Samples 1 and 3 infringe the '508 Patent. These portions are repeated herein.

Categories 11-12

87. Categories 11-12 of Annex 1 can be regarded as relating to the asserted process claims of the '872 Patent – they seek documents on the manufacture of Sample 4, which the Plaintiff asserts has infringed the '872 Patent but not the '508 Patent. In Section B above, I discussed how Sample 4 infringes Claim 1(ii) of the '872 Patent. There is also evidence that Sample 4 falls into the other asserted product claims of the '872 Patent. There is no need for me to go through each and every claim as this is already discussed in the technical report¹² annexed hereto.
88. The fact that Sample 4 falls within the scope of the various asserted product claims of the '872 Patent is a strong basis for inferring that it infringes the asserted process claims, viz Claims 62-71 of the '872 Patent. As pleaded at [4(b)] of the POI, the Plaintiff is not aware of any other methods of manufacture other than those taught in the Patents capable of producing synthetic CVD diamonds possessing the same optical qualities as those manufactured by the Defendant. Indeed, the Defendant has not raised any such alternative methods in its DCC.
89. The documents under these Categories would be highly relevant to establishing the extent to which the Defendant has infringed the process claims of the '872 Patent.

¹² SFW-42(a)

(ii) **Requested document types**

Category 5

90. Pursuant to Category 5 of Annex 1, the Plaintiff is only asking for the following types of documents:
- (a) process specification documents,
 - (b) material characterization analyses,
 - (c) diamond grading reports/certificates, and
 - (d) product specification documents.
91. Regarding (a), the relevance of this type of document is evident. Process specification documents from the Defendant would disclose information on whether and how the Defendant is heat treating its CVD diamond material. This would be highly relevant to the question of whether the Defendant has infringed the various asserted claims of the '508 Patent.
92. Regarding (b)-(d), these types of documents would provide information on the various physical qualities of CVD diamond material heat treated by the Defendant and in particular its colour both before and after heat-treating. Such information would supplement that disclosed in the process specification documents; for example, by looking at the properties of the diamond before and after annealing it

may be possible to determine what annealing temperatures were used, and thus whether they infringed..

Category 11

93. Pursuant to Category 11 of Annex 1, the Plaintiff is only asking for the following types of documents:

- (a) process specification documents,
- (b) CVD synthesis run sheets,
- (c) quality control records,
- (d) documents specifying surface preparation of substrates pre-synthesis, and any subsequent characterisation (by selection or otherwise), and
- (e) documents specifying the level of nitrogen in the synthesis atmosphere and the method by which this is controlled.

94. Regarding (a)-(c), the relevance of these types of document is evident. Such documents from the Defendant would disclose information on whether and how the Defendant is making its single crystal CVD diamond material. This would be highly relevant to the question of whether the Defendant has infringed the various asserted process claims of the '872 Patent.

95. (d) and (e) relate to specific elements in Claim 62 of the '872 Patent (as well as any dependent claim relying on Claim 62). (d) matches with the element of providing a "substrate substantially free of crystal defects" whereas (e) matches with the element of a synthesis atmosphere which contains a controlled amount of nitrogen.

Category 6 and 12

96. Pursuant to Categories 6 and 12 of Annex 1, the Plaintiff is only asking for the following types of documents:

- (a) laboratory notebooks,
- (b) project proposals,
- (c) project reports,
- (d) product development reviews,
- (e) correspondence (e.g. emails) between management and researchers and correspondence between researchers, and
- (f) process revision documents.

97. All these types of documents concern the research, development, conceptualization and/or design of the method(s) disclosed pursuant to Categories 5 and 11. Similar to the process specification documents requested in the preceding Categories, (a)-(f) also discuss the nature of the Defendant's process. There are two reasons why

disclosure of (a)-(f) is necessary even if the process specification documents are also disclosed.

98. Firstly, (a)-(f) are generally less formal documents that are authored by the researchers and would therefore be more detailed and candid as to the exact nature of the Defendant's process. A process specification generally states what should be done based on a standard template, but may not fully reference standard procedures assumed and used laboratory wide. These documents would give background to how this process was derived, assisting in fully understanding the process and what inherent assumptions there are in the process specification.
99. My second point flows from the first. Because (a)-(f) concern the research, development, conceptualisation and/or design of the Defendant's method(s), they would have been created at a time wherein the authors were unsure of whether a specific parameter would have an impact on the resulting diamond material. Most, if not all, parameters in the synthesis and heat treating process may therefore have been discussed extensively in these documents.
100. I therefore view (a)-(f) as important sources of information on the nature of the Defendant's method(s). They are complementary to the documents requested in the preceding Categories.

(iii) **Documents are in Defendant's possession, power or custody**

101. There is strong evidence that:

- (a) Samples 1-4 were manufactured using the claimed processes of the '872 Patent;
- (b) Samples 1 and 3 have been heat treated to change their colour (and hence use the claimed processes of the '508 Patent); and
- (c) Samples 1-4 originate from the Defendant,

102. It is very likely that the Defendant was involved in the manufacture and/or heat treatment of Samples 1-4. It is standard practice in the diamond industry for manufacturers of CVD diamond material to keep proper documentation on how their processes were developed. Such documentation will be very helpful to researchers in the event further iteration or refinement of the processes are needed.

103. It is also standard practice in the diamond industry for manufacturers of CVD diamond material to keep proper documentation on how the final process is to be performed. This is so that employees can reliably repeat the process to produce the specified diamond material. Consequently, it is likely that the Defendant has documentation on how it developed its processes as well as the parameters of the final versions.

104. Additionally, I would highlight that the Defendant has been certified as having met the international standards for ISO 9001:2008. A screenshot from the Defendant's website at <http://2atechnologies.com/iia-technologies-achieves-certification-for-iso-90012008-and-iso-140012004/> announcing the same as well as the ISO 9001:2008 standards (3rd rev) are annexed hereto and exhibited as "SFW-43".

105. ISO 9001:2008 specifies requirements for a quality management system where an organization needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements. All requirements of ISO 9001:2008 are generic and are intended to be applicable to all organizations, regardless of type, size and product provided.
106. I now set out the requirements of ISO 9001:2008 that are relevant in this context:

4.2.1 General

The quality management system documentation shall include:

...

d) documents, including records, determined by the organization to ensure the effective planning, operation and control of its processes.

4.2.4 Control of records

...

The organization shall establish a documented procedure to define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of records. Records shall remain legible, readily identifiable and retrievable.

7.1 Planning of product realization

...

In planning product realization, the organization shall determine the following, as appropriate:

- a) quality objectives and requirements for the product;
- b) the need to establish processes and documents, and to provide resources specific to the product;

- c) required verification, validation, monitoring, measurement, inspection and test activities specific to the product and the criteria for product acceptance;
- d) records needed to provide evidence that the realization processes and resulting product meet requirements (see 4.2.4).

...

7.3.1 Design and development planning

The organization shall plan and control the design and development of product.

During the design and development planning, the organization shall determine:

- a) the design and development stages,
- b) the review, verification and validation that are appropriate to each design and development stage, and
- c) the responsibilities and authorities for design and development.

The organization shall manage the interfaces between different groups involved in design and development to ensure effective communication and clear assignment of responsibility. Planning output shall be updated, as appropriate, as the design and development progresses.

Note: Design and development review, verification and validation have distinct purposes. They can be conducted and recorded separately or in any combination, as suitable for the product and the organization.

7.3.4 Design and development review

At suitable, stages, systematic reviews of design and development shall be performed in accordance with planned arrangements (see 7.3.1).

- a) to evaluate the ability of the results of design and development to meet requirements, and
- b) to identify any problems and propose necessary actions.

Participants in such reviews shall include representatives of functions concerned with the design and development stage(s) being reviewed. Records of the results of the reviews and any necessary actions shall be maintained (see 4.2.4).

7.3.7 Control of design and development changes

Design and development changes shall be identified and records maintained...

7.5.1 Control of production and service provision

The organization shall plan and carry out production and service provision under controlled conditions. Controlled conditions shall include, as applicable:

- a) the availability of information that describes the characteristics of the product,
- b) the availability of work instructions, as necessary,
- c) the use of suitable equipment,
- d) the availability and use of monitoring and measuring equipment.
- e) the implementation of monitoring and measurement, and...

7.5.2 Validation of processes for production and service provision

The organization shall validate any processes for production and service provision where the resulting output cannot be verified by subsequent monitoring or measurement and as a consequence, deficiencies become apparent only after the product is in use or the service has been delivered.

Validation shall demonstrate the ability of these processes to achieve planned results.

The organization shall establish arrangements for these processes including, as applicable,

- a) defined criteria for review and approval of the processes,
- b) approval of equipment and qualification of personnel,
- c) use of specific methods and procedures,
- d) requirement for records (see 4.2.4), and
- e) revalidation.

8.2.4 Monitoring and measurement of product

The organization shall monitor and measure the characteristics of the product to verify that product requirements have been met. This shall be carried out at appropriate stages of the product realization process in accordance with the planned arrangements (see 7.1). Evidence of conformity with the acceptance criteria shall be maintained.

...

107. Given that the Defendant is ISO 9001:2008 accredited, it should have had all of the document types requested in the Process Categories in its possession at some point.

The following table sets out the relevant paragraph numbers in the ISO 9001:2008 standards that support the existence of each document type:

Document type	Para no. in ISO9001:2008 (3rd rev)
Category 5(a)-(d), Category 11(a)-(e)	4.2.1, 4.2.4, 7.5.1, 7.5.1, 8.2.4
Category 6(a)-(f), Category 12(a)-(f)	4.2.1, 4.2.4, 7.1, 7.3.1, 7.3.4, 7.3.7

108. I further note that ISO 9001:2008 explicitly requires the retention of documents for a sufficiently long period to benefit from feedback on the product from the market: see 7.5.2 of the ISO 9001:2008 standards (3rd rev).
109. The Defendant announced its certification on 18 September 2014. To achieve this certification requires a lead in time of typically one year to build up evidence of proper document control; the system must have been running for 6 months prior to certification, and the a pre-audit must take place at 3 months before the final full certification audit during which the business must demonstrate all the key policies are documented and in place. Once certified, the company must undergo periodic audit once each year, and recertification every 3 years. The ISO standard is periodically revised, generally bringing in further requirements, and certified companies must transition to the new standard when available A new revision of ISO 9001 was published in September 2015 by the International Standards Organisation, and a 3 year transition period is provided. Therefore the Defendant

needs to transition to ISO 9001:2015 by September 2018, and it would be expected that this process would already be in hand.

110. It follows that at around 18 September 2014, the Defendant had the documents under the Process Categories in its possession. Assuming it complied with the requirements for the initial certification, such documents should have remained in the Defendant's possession. The Defendant's claim that it does not have any documents under Categories 11 and 12 can only be correct if, after their ISO certification it then destroyed those records, ignoring the requirements for annual period audit and recertification in 3 years' time and the requirement for document retention as set out in Paragraph 108 above, or it destroyed them following the initiation of litigation in early 2016, some 18 months after the ISO certification.
111. In light of the foregoing, the Defendant's claim that it has no documents under Categories 11 and 12 is unbelievable. Although the Defendant has not stated whether it has documents under Categories 5 and 6 in its possession, such a claim would likewise be unbelievable.

E. SAMPLES CATEGORIES

(i) Relevance

112. Categories 7-9 relate to documents on the provenance of Samples 1-3. As discussed in Section B, it is very likely that Samples 1-3 originated from the Defendant in Singapore and that there is some commercial relationship between the Defendant and GDC, ME and PGD. In response, the Defendant has merely denied any

knowledge of Samples 1-3: DCC at [5(b)(viii)], [5(b)(xi)-(xiiiB)] and [5(b)(xiv)-(xvi)].

113. Since the Defendant has not admitted that it made or otherwise dealt with Samples 1-3, it falls to the Plaintiff to prove at trial that the Defendant had, in fact, made or otherwise dealt with Samples 1-3. By extension, documents which go towards establishing that Samples 1-3 was made or dealt with by the Defendant would support the Plaintiff's case and are therefore highly relevant.
114. Category 4 relates to any dealings that the Defendant may have had in connection with Sample 4. As stated above, the Plaintiff already possesses some documents showing that the Defendant at least disposed of and offered to dispose of Sample 4. Any documents which go towards reinforcing this or showing that the Defendant committed other infringing acts in relation to Sample 4 (e.g. use, keeping for disposal) would be highly relevant.

(ii) Requested documents

Categories 7-9

115. Under Categories 7 and 9 of Annex 1, the Plaintiff is asking for the following types of documents in relation to gemological Samples 1 and 3 respectively:
 - (a) sales invoices,
 - (b) purchase orders,

- (c) quotations,
- (d) marketing materials,
- (e) product specification documents,
- (f) material characterization analyses, and
- (g) diamond grading reports/certificates.

116. Category 8 asks for the same types of documents except that:

- (a) Category 8(a)-(c) have been blanked out as these have been provided by the Defendant; and
- (b) Category 8 does not include (g), which is irrelevant since Sample 2 is not intended for gemological purposes.

117. On a general level, these documents are relevant because they would assist the Plaintiff in proving at trial that the Samples originated from the Defendant in Singapore (to which the Defendant has made a bare denial). It will be recalled that the Plaintiff has already obtained various third party documents that evidence that the Samples originated from the Defendant in Singapore. This connection will be reinforced if express references to the Samples can be found in the Defendant's own documents. I will now address each of the document types.

118. As regards (a)-(d), these are essentially commercial documents that are likely to have been created by the Defendant in support of the various transactions that led to the supply (whether direct or indirect) of the Samples by the Defendant to the various retailers. I emphasize that the request for these document types is not a fishing expedition – there is already strong evidence to show that the Samples were supplied by the Defendant to the various retailers. The disclosure of these documents would paint a clearer picture for the Plaintiff in tracing the supply chain of the Samples from the retailers all the way back to the Defendant.
119. As regards (e) and (f), these documents would be relevant insofar as there is any dispute between the parties as to whether Samples 1-3 contain physical qualities (e.g. birefringence values) that fall within the scope of the Patents. The Defendant has alleged/implied that Samples 1-3 may have been ‘tampered’ with after leaving its possession. Insofar as any of the claimed physical qualities (such as birefringence) of Samples 1-3 are measured and recorded by the Defendant, such documents would be relevant and serve to cut down on some of the disputes between the parties.
120. Additionally, these documents would provide information on the physical properties of specified diamond material. Upon obtaining these documents, the Plaintiff would be able to compare the physical properties of the Samples with the physical properties of the diamond material analyzed in the disclosed documents. If there is a match between the Samples and one of the diamond materials analyzed in the disclosed documents, this will be additional evidence that the Sample were made by the Defendant.

121. In this connection, I note that the Samples have already been extensively analyzed by the Plaintiff. Many of the physical properties analyzed are the subject of the Plaintiff's Notice of Experiments filed on 23 December 2016, and include the following:

- (i) Whether the diamond sample is synthetic;
- (ii) Whether the diamond sample is CVD synthetic;
- (iii) The diamond sample's optical birefringence;
- (iv) The diamond sample's absorption coefficient;
- (v) The diamond sample's Raman normalized luminescence intensities;
- (vi) Whether the diamond sample was annealed subsequent to growth;
- (vii) Concentration of single substitutional nitrogen in the diamond sample.

122. As regards (g), diamond grading reports/certificates are similar to (e) and (f) in that they also provide information about the physical properties of diamond material, albeit with a gemological slant. Diamond grading reports/certificates elaborate on aesthetic properties such as colour and clarity. Such documents would likewise allow the Plaintiff to compare the physical properties of Samples 1 and 3 with the physical properties of the diamond material analyzed in the disclosed diamond grading reports/certificates. If there is a match between Samples 1 and 3 and one of the

diamond materials analyzed in the disclosed documents, this will be strong evidence that Samples 1 and 3 were made by the Defendant.

Category 10

123. Category 10 seeks the following document types:

- (a) product specification documents;
- (b) material characterization analyses,
- (c) sales invoices, quotations and marketing materials provided by the Defendant to third parties,
- (d) importation documentation, and
- (e) inventory lists.

124. (a)-(b) would be relevant insofar as there is any dispute between the parties as to whether Sample 4 contains physical qualities (e.g. birefringence values) that fall within the scope of the Patents. The Defendant has alleged/implied that Sample 4 may have been ‘tampered’ with after leaving its possession – see DCC at [5(b)(xvii)]. Insofar as any of the claimed physical qualities (such as birefringence) of Sample 4 are measured and recorded by the Defendant, such documents would be relevant and serve to cut down on some of the disputes between the parties.

125. (c)-(e) are relevant to the issue of infringement as they go towards the nature and extent of the Defendant's dealings with Sample 4.

(iii) **Documents are in Defendant's possession, power or custody**

126. Given the strong evidence showing that Samples 1-4 originate from the Defendant in Singapore, it is highly likely that the Defendant possesses the documents falling under these Categories.
127. If the Defendant no longer has any of the documents under Categories 7-10 in its possession, custody or power, the Defendant must state whether they have at any time been in its possession, custody or power, and if not now in its possession, custody or power, when it parted with them and what has become of them.

F. MISCELLANEOUS CATEGORIES

(i) **Category 13**

128. Category 13 relates to official documents on the incorporation of "IIa Holdings Group" and/or "IIa Holdings Group Limited". In [4(d)-(e)] of the DCC, the Defendant stated that it and PGD are part of the "IIA Holdings Group". However, the Defendant does not provide any further details in its pleadings about what it means by "IIA Holdings Group".
129. The relationship between PGD, GDC and the Defendant is of importance to the Plaintiff's case against the Defendant vis-à-vis Samples 1 and 3. This is because

Samples 1 and 3 were not obtained directly from the Defendant but from GDC and PGD respectively.

130. If the Plaintiff establishes a link between these third party retailers and the Defendant, this would be strong evidence that Samples 1 and 3 originate from the Defendant. By extension, the relationships between these entities is also of importance to the Defendant's case against the Plaintiff, as the Defendant intends to dispute that Samples 1 and 3 originate from it.
131. The Category 13 documents would therefore be highly relevant as they would shed light on the connections between "Ila Holdings Group" and/or "Ila Holdings Group Limited" and the retailers of Samples 1 and 3.

G. ELECTRONIC DISCOVERY

(i) Relevance and Accuracy

132. The reasonable search prescribed by the Protocol is reproduced for convenience:

Search No.	Search Terms	Scope
1	"LG*10061905"	Documents that were created in the period 16 April 2010 and 16 April 2013
2	"INV*REF*01*JAN*12*31"	Documents that were created in the period 16 March 2012 and 16 March 2013

3	"100005382"	Documents that were created in the period 16 March 2012 and 16 March 2013
4	"2*PCVD*303004N"	Documents that were created in the period 12 May 2013 and 12 May 2015
5	"3086"	Documents that were created in the period 12 April 2014 and 12 April 2015
6	"13*2051"	Documents that were created in the period 24 January 2014 and 24 January 2015
7	"1314*121"	Documents that were created in the 24 February 2013 and 24 February 2015
8	"LG*10226420"	Documents that were created in the period 27 October 2014 to 27 October 2016
9	"1510*00178"	Documents that were created in the period 27 September 2015 to 27 September 2016

133. Preliminarily, it will be noted that wildcard characters (“*”) are interspersed in the search terms. The reason for this is that the Defendant’s documents might not always use the search terms with the exact same syntax. For example, instead of referring to “LG10061905”, which is the product code for Sample 1, it may use the term “LG-10051906” (i.e. with a hyphen). I also note that the above searches are narrow in scope as they are restricted only to documents created within periods of 1-2 years.

134. I will address the relevance and accuracy of each search term *seriatim*.

Search 1: “LG*10061905”

135. Sample 1 was purchased from GDC under the product code LG10061905. There are various references to this product code in the purchase documentation¹³ for Sample 1:

- (a) Sample 1 is described as “LG10061905” in INV-REF/01-JAN-12/31, which is the invoice issued by GDC;
- (b) Sample 1 is given the certificate number “LG10061905” in packing slip #PL-5382;
- (c) The accompanying IGI certificate has a report number of “LG10061905”.

Search 2: “INV*REF*01*JAN*12*31”

136. As stated above, INV-REF/01-JAN-12/31 is the invoice number of the certificate issued by GDC in connection to the purchase of Sample 1 by the investigators.

Search 3: “100005382”

137. 100005382 is the order number issued by GDC when investigators engaged by AL placed an online order for Sample 1.

Search 4: “2*PCVD*303004N”

¹³ SFW-37(d)-(i)

138. Sample 2 was purchased from ME under the product code 2PCVD303004N. There are various references to this product code in the purchase documentation¹⁴ for Sample 2:

(a) In ME Quote #13-2051, 2PCVD303004N is listed as one of the item codes. Sample 2 was taken from this group of diamond plates.

(b) In Invoice # 3086 dated 12 May 2014 from ME, 2PCVD303004N is listed as one of the item codes. Sample 2 was taken from this group of diamond plates.

(c) In the packing slip to Invoice # 3086, 2PCVD303004N is listed as the only item code.

Search 5: "3086"

139. As stated above, "3086" is the invoice number for the invoice issued by ME in connection to the purchase of Sample 2.

Search 6: "13*2051"

140. As stated above, "13-2051" is the quote number for the quote issued by ME in connection to the purchase of Sample 2. This quote number is referenced in Invoice # 3086.

¹⁴ SFW-39(b)-(g)

Search 7: “1314*121”

141. In ME Quote #13-2051, reference is made to Ila Quote # “1314-121”. This document is a quotation issued by the Defendant to ME in connection with Sample 2. In other words, Sample 2 was made by the Defendant, then transferred to ME before being trap purchased under the Plaintiff’s instructions. This is not surprising, given the Plaintiff’s position that the Samples were ultimately all made by the Defendant.

Search 8: “LG*10226420”

142. Sample 3 was purchased from PGD under the product code LG10226420. There are various references to this product code in the purchase documentation¹⁵ for Sample 3:

- (a) In invoice no. SA-1510-00178, the invoice issued by PGD in connection with the purchase of Sample 3, LG10226420 is listed as one of the diamond materials under the Details column – this diamond material comprises Sample 3;
- (b) The accompanying IGI certificate has a report number of “LG10226420”.

Search 9: “1510*00178”

143. As stated above, “SA-1510-00178” is the invoice number for the invoice issued by PGD in connection with the purchase of Sample 3.

¹⁵ SFW-40(d)-(h)

144. In sum, the above searches target various invoice numbers, product code numbers, quotation numbers, etc., all of the foregoing having connection to the purchase documents for Samples 1-3. Any such documents that are discovered in the Defendant's possession would be highly indicative that Samples 1-3 originate from the Defendant in Singapore.

(ii) **Proportionality and Economy**

145. In my view, electronic discovery is required in this case over and beyond normal discovery for the following reasons:

(a) The Defendant was established in 2005¹⁶, at which point it was already common for businesses to store and work off documents in electronic form. It is likely that most of the Defendant's documents are in electronic form. It is unclear how many electronic documents are in the Defendant's possession, but the number is expected to be sizable given that the Defendant has been in business for around 12 years. Electronic discovery will help to ensure that fewer relevant documents are missed out. In this connection, I observe that the Defendant claims it does not have any document under categories 7, 8(d)-(f), 9, 10, 11, 12, and 13 of the Discovery Letter in its possession, custody and/or power.

(b) The Suit concerns the synthesis and heat treatment of CVD diamond material, which is a technical complex matter. The Suit is further

¹⁶ See Statement of Claim (Amendment No.1) at [4], DCC at [4(c)]

complicated by the fact that the Defendant has made attacks on the provenance of the Samples. Whilst the Plaintiff has strong evidence connecting the Samples to the Defendant, the exact supply chain connecting the Samples from the Defendant to the end-retailers (e.g. GDC, ME, etc.) remains unclear. Electronic discovery with targeted and accurate search terms will help to shed light on the matter.

- (c) The Plaintiff is only asking for documents contained in “All email servers, cloud servers and network drives currently in the Defendant’s custody, power, control and/or possession.” In other words, the Plaintiff only requires the Defendant to collate documents that are already located in central databases, as opposed to going through every single electronic storage medium (e.g. laptops, USB drives, etc.). While there may indeed be relevant documents in these individual storage mediums, the Plaintiff has declined to include these in the scope of the Protocol so as to be reasonable. Consequently, the repositories are easily and cheaply accessible.
- (d) It is plain from the discussion of the search terms above that they are very accurate and relevant, as they are based on specific product codes or invoice/quotation numbers. Any documents that come up during the searches would almost invariably be material and relevant to the Plaintiff’s case on infringement.

(iii) Service Provider and Software

146. In the Protocol, the Plaintiff has stipulated Litigation Edge Pte Ltd (“LE”) as the party which will be executing the search using the specified search parameters, and Nuix as the software to be used for executing the search.
147. By way of background, I annex a write-up on LE as well as a summary on past projects that LE has been involved in hereto as part of “**SFW-44**” (i.e. SFW-44(a)-(b)). These documents were provided by LE. I would highlight the following salient points:
- (a) LE was incorporated in 2011 with the goal of providing eDiscovery services for Singapore law practices.
 - (b) Members of the LE team have been involved in more than 70 eDiscovery projects, including 8 High Court projects;
 - (c) LE has substantial experience in executing eDiscovery searches. For example, in a prior High Court case involving the breach of a joint venture agreement, they conducted a remote collection of documents in workstations and shared drives, and subsequently executed an eDiscovery protocol. In another High Court case involving commercial breach of contract, LE executed an agreed eDiscovery protocol including forensic imaging, preparing and coordinating detailed eDiscovery work plan, search execution, privilege search execution, documentation of search results, preparing draft electronic index of files and native production.

148. In the round, I believe that LE would have the experience and expertise necessary to execute the searches specified in the Protocol.

149. I now turn to the Plaintiff's choice of software to index and search the documents to be provided by the Defendant, namely Nuix. By way of background, I annex a brochure on Nuix hereto as part of "SFW-44" (i.e. SFW-44(c)). As stated on page 2 of the brochure,

"The Nuix Engine uses a patented parallel processing technology to index and search unstructured data at the binary level with unmatched speed and forensic rigor.

Nuix supports hundreds of file types and processes the formats enterprises use to store their data including:

- *File shares*
- *Email servers*
- *Email archives*
- *Cloud repositories*
- *Microsoft Exchange, Exchange Web Services, and SharePoint*
- *Mobile devices.*"

150. Importantly, Nuix supports and processes data stored in email servers, cloud repositories and file shares. These are some of the repositories that the Plaintiff is asking for.

151. It will also be recalled that the search terms have various wildcard characters within them. I am advised by LE that Nuix is suitable for executing the search in the Protocol as it can handle such wildcard searches due to its indexing and search capabilities.
152. In the round, I believe that Nuix is an appropriate and effective software for executing the Protocol.
153. I humbly pray for an order in terms of the application filed herein.

Affirmed by the abovenamed)

SUSAN JANE FLETCHER WATTS)

in the United Kingdom)

on the 27 day of March 2018)

Susan J. Fletcher Watts

Before Me,

Richard Gareth Griffiths

A NOTARY PUBLIC

RICHARD GARETH GRIFFITHS
Solicitor & Notary Public
Downend Lodge
Chieveley
ENGLAND RG20 8TN

This affidavit is filed on behalf of the Plaintiff.



This is the Exhibit marked "SFW-35"

referred to in the Affidavit of

Susan Jane Fletcher Watts

affirmed in the United Kingdom

on this 27th day of March 2018

Before me



A NOTARY PUBLIC

RICHARD GARETH GRIFFITHS
Solicitor & Notary Public
Downend Lodge
Chieveley
ENGLAND RG20 8TN

IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

HC/S 26/2016

Between

ELEMENT SIX TECHNOLOGIES LIMITED

(United Kingdom Registration No. 08206603)

...Plaintiff

And

Ila TECHNOLOGIES PTE. LTD.

(Singapore UEN No. 200516961K)

...Defendant

LIST OF DOCUMENTS

The following is a list of the documents relating to the matters in question in this action which are or have been in the possession, custody or power of the abovenamed Defendant. This List of Documents is filed without prejudice to any further lists of documents that may be necessary for the Defendant to file.

1. The Defendant have in their possession, custody or power, the documents relating to the matters in question in this action enumerated in Part I of Schedule 1 hereto.

2. The Defendant objects to produce the documents enumerated in Part II of Schedule 1 on the ground that the said documents are, as appear from their description or nature, privileged from production.

3. To the best of the Defendant's knowledge at this juncture, neither the Defendant nor its solicitors nor any other person on their behalf, has now, or ever had, in its possession, custody or power any document of any description whatsoever relating to any matter in question in this action, other than the documents enumerated in the Schedule 1 hereto. If there are further documents relating to any matter in question in this action which comes into the Defendant's possession, custody or power and / or are found to be relevant by the Defendant due to subsequent discovery or otherwise, these documents will be disclosed in a Supplementary List.

SCHEDULE 1

PART I

S/No.	Date	Description (Copies unless otherwise stated)
DOCUMENTS RELATING TO PATENTS IN THE SUIT		
1.	18 March 2004	International Publication No. WO 2004/022821
2.	3 June 2004	International Publication No. WO 2004/046427
3.	30 May 2005	Singapore Patent No. 110508
4.	28 November 2005	Singapore Patent No. 115872
5.	1 December 2015	Singapore Patent No. 115872 (after post-grant amendments)
6.	17 September 2008	Letter from IPOS titled "Reminder Letter for Renewal" for Singapore Patent No. 110508
7.	25 February 2009	Form PF15 from IPOS for Singapore Patent No. 110508

S/No.	Date	Description (Copies unless otherwise stated)
8.	25 February 2009	Form PF16 from IPOS for Singapore Patent No. 110508,
9.	3 March 2009	Form PF15 from IPOS for Singapore Patent No. 115872
10.	3 March 2009	Form PF16 from IPOS for Singapore Patent No. 115872
11.	1 July 2014	Form CM8 from IPOS for Singapore Patent No. 115872
12.	1 July 2014	Letter from IPOS to Amica Law LLC
13.	2 October 2014	Letter from IPOS to Amica Law LLC
14.	12 November 2014	Letter from IPOS titled "Recordal of Transfer of Ownership" for Singapore Patent No. 110508
15.	13 August 2015	Letter from Amica Law LLC to IPOS
16.	13 August 2015	Patents Form 17 for SG Patent No. 115872
17.	20 August 2015	Letter from IPOS to Amica Law LLC
18.	29 September 2015	The Patents Journal Singapore Issue No. 201509A
19.	25 November 2015	Letter from IPOS to Amica Law LLC
20.	1 December 2015	Letter from Amica Law LLC to IPOS
21.	1 December 2015	Letter from IPOS to Amica Law LLC
22.	11 April 2016 (date accessed)	Printout of patent register for Singapore Patent No. 110508 from www.ipos.gov.sg
23.	11 April 2016 (date accessed)	Printout of patent register for Singapore Patent No. 115872 from www.ipos.gov.sg
PRIOR ART & OTHER DOCUMENTS		
24.	January 1952	A paper entitled: 'Differences between counting and non-counting diamonds – Part II: Birefringency and Luminescence' – G.P. Freeman & H.A. van der Velden, Physica, Vol. 18, Issue 1, pp. 9-19
25.	7 November 1978	US Patent No. 4,124,690
26.	13 November	US Patent No. 4,174,380

S/No.	Date	Description (Copies unless otherwise stated)
	1979	
27.	March 1981	A paper entitled 'Dosimetry with a Diamond operating as a resistor' – E.A. Burgemeister, Physics in Medicine and Biology Vol. 26, Issue 2, pp. 269-275
28.	14 August 1984	US Patent No. 4,465,932
29.	August 1991	A paper entitled: 'Rapid growth of single-crystal diamond on diamond substrates' – G. Janssen, W. Vollenberg, L.J. Giling, W.J.P. van Enckervort, J.J.D. Schaminee & M. Seal, Surface and coatings Technology, Vol. 47, Issues 1–3, pp. 113-126
30.	1 May 1992	A paper entitled: 'Characterization of single-crystal diamond grown by chemical vapour deposition processes' – G. Janssen, W.J.P van Enckevort, W. Vollenberg & L.J. Giling, Diamond and Related Materials, Vol. 1, Issue 7, pp. 789-800
31.	31 March 1993	A paper entitled: 'Diamond homoepitaxy by chemical vapour deposition' – Andrzej Badzain & Teresa Badzain; Diamond and Related Materials, Vol. 2, Issues 2-4, pp. 147-157
32.	13 April 1993	A paper entitled: 'Diamond windows for IR applications in adverse environments' – Claude A. Klein, Diamond and Related Materials, Vol. 2, Issues 5-7, pp. 1024-1032
33.	Fall 1993	A paper entitled: 'Two Near-Colourless General Electric Type-IIA Synthetic Diamond Crystals' – James E. Shigley, Emmanuel Feritsch & Hene Reinitz, Gems & Gemology, Vol. 29, Issue 3, pp. 191-197
34.	14 December 1993	US Patent No. 5,270,028
35.	April 1994	A paper entitled: 'Flame Deposition and characterisation of Large Type Ila Diamond Single Crystal', by JJ Schermer, WJP van Enckvort and LP Gilling; Diamond and Related Materials; Vol 3; Issues 4-6, Pages 408-416
36.	4 July 1994	A paper entitled: 'Nitrogen stabilized 100 texture in Chemical Vapor deposited diamond films.' R. Locher, C. Wild, N. Herres, D. Behr and P Koidl, Applied Physics Letters, Vol 65, No. 1
37.	21 September 1994	Europe Patent No. 0651954
38.	20 March 1995	A paper entitled: 'Homoepitaxial diamond film deposition on a brilliant cut diamond anvil' – Thomas S. McCauley & Yogesh K. Vohra, Applied Physics Letters, Vol. 66, Issue

S/No.	Date	Description (Copies unless otherwise stated)
		12, pp. 1486- 1488
39.	13 September 1995	Europe Patent No. 0671482A1
40.	19 September 1995	US Patent No. 5,451,430
41.	24 October 1995	Japan Patent No. 07-277890A (translated)
42.	12 December 1995	US Patent No. 5,474,021
43.	July 1996	A paper entitled: 'Characterization and lattice location of nitrogen and boron in homoepitaxial CVD diamond' – R. Samlenski, C. Haug, R. Brenn, C. Wild, R. Locher & P. Koidl; Diamond and Related Materials, Vol. 5, Issues 9, pp. 947-951
44.	1 January 1997	A paper entitled: 'A Study of Surface morphologies of (001) homoepitaxial diamond films', Naesung Lee, Andrzej Badzian, Diamond and Related Materials, Vol. 6 Issue 1 (1997) pg 130-145
45.	1 January 1997	A paper entitled: 'The characterization of strain, impurity content, and crush strength of synthetic diamond crystals' – Terri L. McCormick, Journal of Materials Research, Vol. 12 Issue 1, pp.253-263
46.	2 July 1997	A paper entitled: 'Crystalline perfection of high purity synthetic diamond crystal' – H. Sumiya, N. Toda, Y. Nishibayashi & S. Satoh, Journal of Crystal Growth, Vol. 178, Issue 4, pp. 485-494
47.	10 March 1999	Europe Patent No. 0594994
48.	November 1999	A paper entitled: 'Multiple twinning and nitrogen defect center in CVD homeoepitaxial diamond' by Chih-Shiue Yan and Yogesh K. Vohra, Diamond and Related Materials Vol 8 Issue 11 (1999) page 2022- 2031
49.	2000	A chapter in the textbook entitled: 'Electric Refractory Materials' edited by Yukinobu Kumashiro, Chapter 15: Synthesis of Diamond from the Gas Phase by Andrzej Badzain, page 347 – 368
50.	Spring 2000	A paper entitled: 'Spectroscopic evidence of GE POL HPHT-treated natural type IIa diamonds' by David Fisher and Raymond A Spits, Gems & Gemology, Vol 36, No. 1, page 42-49, Spring 2000;
51.	22 July 2000	A paper entitled 'Analysis of Large Single Crystal CVD Diamond' by J.E. Butler, T.A. Kennedy, J.S. Colton, S. Qadri, R. Linares, P. Doering, M. Newton, C. Glover, H.

S/No.	Date	Description (Copies unless otherwise stated)
		Smith & A. Collins given at the United States Naval Research Academy was presented on 22 July 2000
52.	31 July 2000	A paper entitled: 'Nitrogen incorporation in diamond films homoepitaxially grown by chemical vapour deposition' – Konstantin Iakoubovskii, Guy J. Adriaenssens & Yogesh K. Vohra, Journal of Physics: condensed Matter, Vol. 12, Issue 30, pp. L519-524
53.	September – October 2000	A paper entitled 'Growth and characterization of hillock-free high quality homoepitaxial diamond films' – Chunlei Wang, Masatake Irie & Toshimichi Ito; Diamond and Related Materials, Vol: 9, Issues 9-10, pp. 1650-1654
54.	19 December 2000	US Patent No. 6,162,412
55.	March – July 2001	A paper entitled: "Nitrogen incorporation in CVD diamond", K. Iakoubovskii, et al.; Diamond and Related Materials, 10 (2001) 485 – 489
56.	1 March 2001	International Publication No. WO 2001/14050
57.	4 October 2001	International Publication No. WO 2001/72406
58.	18 October 2001	US Patent Application No. 2001/0031237
59.	20 December 2001	International Publication No. WO 2001/96634
60.	21 February 2002	International Publication No. WO 2002/13958
61.	27 June 2002	US Patent Application No. 2002/0081260
62.	Summer 2002	A paper entitled: 'Characterisation and Grading of Natural-Colour Pink Diamonds' by John M King, James E Shigley, Scott S Guhin, Thomas H Gelb and Matthew Hall, Gems & Gemology, Vol 38, No. 2, page 128 to 147, Summer 2002
63.	6 September 2002	A paper entitled: 'High Carrier Mobility in Single-Crystal Plasma-Deposited Diamond' – Jan Isberg, Johan Hammersberg, Erik Johansson, Tobias Wikström, Daniel J. Twitchen, Andrew J. Whitehead, Steven E. Coe & Geoffrey A. Scarsbrook; Science, Vol. 297, Issue 5587, pp. 1670-1672
64.	October 2002	A paper entitled: 'Single-Qubit Operations with the Nitrogen- Vacancy Center in Diamond' – T.A. Kennedy, F.T. Charnock, J.S. Colton, J.E. Butler, R.C. Linares & P.J. Doering, Physica Status Solidi (B), Vol. 233, Issue 3, pp. 416-426

S/No.	Date	Description (Copies unless otherwise stated)
65.	1 October 2002	A paper entitled: 'Very high growth rate chemical vapour deposition of single-crystal diamond' – Chih-shiue Yan, Yogesh K. Vohra, Ho-kwang Mao & Russell J. Hemley, Proceedings of the National Academy of Sciences of the United States of America, Vol. 99, Issue 20, pp. 12523-12525
66.	25 October 2002	A paper entitled: 'High pressure-high temperature treatment of natural diamonds' by J van Royen and Yu Pal'yanov; Journal of Physics: Condensed Mater, 14 (2002) 10953 – 10956
67.	4 – 8 November 2002	A paper entitled: 'Status of the R&Ds on Diamond Particle Detectors' – Mara Bruzzi; given at the 11th International Workshop on Vertex Detectors at the Ohana Keauhou Beach Resort 78-6740, Alii Drive, Kailuat-Kona, Hawaii was presented between the 4 – 8 November 2002
68.	21 November 2002	US Patent Application No. 2002/0172638
69.	July 2003	A presentation entitled: 'Characterisation of HPHT Annealed Single Crystal CVD Diamond' by JE Butler, BN Feygelson, CH Yan, HK Mao and R Hemley, presented at the annual Diamond Physics Meeting, sponsored by DeBeers, July 2003
70.	21 – 25 September 2003	A paper entitled: 'Diamond Solid Etalons for High-Stability DWDM Wavelength-Lockers' by E.P. Houwman, H.P. Godfried, C.E. Hall, J. Fraser, L. Daykin, S.J. Pope & K. Mullaney presented at the ECOC-IOOC 2003, 29th European Conference on Optical Communication & 14th International Conference on Integrated Optics and Optical Fibre Communication held in Rimini, Italy between the 21-25 September 2003
71.	25 October 2003	Archival web page from the website www.e6.com
72.	20 November 2003	Printout from Google search page for the words and/or phrase "CVD diamonds for etalon"
73.	18 May 2004	Written opinion from the International Preliminary Examining Authority for International PCT Application PCT/IB2003/003783
74.	17 August 2004	Response by Element Six Limited to the European Patent Office in respect of in respect of International PCT Application PCT/IB2003/003783
75.	31 August 2004	International Preliminary Examination Report for International PCT Application PCT/IB2003/005281

S/No.	Date	Description (Copies unless otherwise stated)
76.	27 September 2004	International Preliminary Examination Report against International PCT Application PCT/IB2003/003783
77.	25 July 2005	Communication from European Patent Office to Element Six Limited in respect of European Patent Application No. 03793979.0
78.	2 December 2005	Response by Element Six Limited to the European Patent Office in respect of European Patent Application No. 03793979.0
79.	9 February 2007	Communication from European Patent Office to Element Six Limited in respect of European Patent Application No. 03772484.6
80.	8 June 2007	Response by Element Six Limited to the European Patent Office in respect of European Patent Application No. 03772484.6
81.	14 December 2010	Letter from Carpmals & Ransford to the European Patent Office in respect of European Patent Application No. 03772484.6
82.	16 April 2012	Invoice number INV-REF/Q1-JAN-12/31 from Gemesis Diamond Company
83.	3 September 2013	Communication from European Patent Office to Element Six Limited in respect of European Patent Application No. 03772484.6
84.	28 October 2013	Response by Element Six Limited to the European Patent Office in respect of European Patent Application No. 03772484.6
85.	24 February 2014	Quote No. 13-2051 from Microwave Enterprise
86.	12 May 2014	Invoice number 3086 from Microwave Enterprise
87.	7 July 2014	Letter from Element Six Limited to the European Patent Office regarding the assignment of European Patent Application No. EP 03772484.6
88.	18 September 2014	Communication from the European Patent Office to Element Six Technologies Limited on the decision to grant European Patent Application No. 03772484.6
89.	23 October 2015	Quotation No. IIa/QT/1516-124
90.	27 October 2015	Invoice No. SA-1510-00178 from Pure Grown Diamonds Inc
91.	27 October 2015	Packing List of Laboratory Grown Diamonds from Pure Grown Diamonds Inc.

S/No.	Date	Description (Copies unless otherwise stated)
92.	27 October 2015	Commercial Invoice from Pure Grown Diamonds Incs.
93.	27 October 2015	FEDEX Shipping Slip (to Mrs Ayako Lawson)
94.	8 January 2016	Tax Invoice No. Ila/INV/1516-0241 from Ila Technologies Pte Ltd
95.	8-Jan-16	Delivery Order No. Ila/DO/1516-0241 from Ila Technologies Pte Ltd
96.	5 October 2016 (date accessed)	Printout from whois lookup on domain registration for 2atechnologies.com
97.	5 October 2016 (date accessed)	GIA Report 5172659546
98.	5 October 2016 (date accessed)	GIA Report 5186009158
99.	Undated	Element Six Brochure titled "Diamond etalons"
100.	Undated	Archival web pages from the website www.e6.com

PART II

Cause papers, notes and instructions to the Defendant's solicitors and confidential communications between the Defendant and their solicitors and between solicitors and others with reference to the matters in question in this action for the purpose of obtaining legal advice and/or correspondence between the Defendant and/or their solicitors and third parties for the purposes of the present litigation; and without prejudice correspondence and communication.

NOTICE TO INSPECT

TAKE NOTICE that the documents in the above list, may be inspected at the office of the Solicitors of the abovenamed Defendant at 10 Collyer Quay, #10-00 Ocean Financial Centre, Singapore 049315, by prior appointment between the hours of 10.00am and 5.00 pm, on any working day within seven (7) days of service of this list on the Defendant or its solicitors.

Dated this 7th Day of October 2016

A handwritten signature in black ink, appearing to read 'Drew & Napier', with a horizontal line extending to the right.

**DREW & NAPIER LLC
SOLICITORS FOR THE DEFENDANT**

To: The Plaintiff (and its solicitors)

Amica Law LLC

30 Raffles Place

#14-01 Chevron House

Singapore 048622

IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

HC/S 26/2016

Between

ELEMENT SIX TECHNOLOGIES LIMITED

(United Kingdom Registration No. 08206603)

...Plaintiff

And

Ila TECHNOLOGIES PTE. LTD.

(Singapore UEN No. 200516961K)

...Defendant

SUPPLEMENTARY LIST OF DOCUMENTS

The following is a Supplementary List of the Documents relating to the matters in question in this action which are or have been in the possession, custody or power of the abovenamed Defendant. This Supplementary List of Documents is filed without prejudice to any further lists of documents that may be necessary for the Defendant to file.

1. The Defendant have in their possession, custody or power, the documents relating to the matters in question in this action enumerated in Part I of Schedule 1 hereto.

2. The Defendant object to produce the documents enumerated in Part II of Schedule 1 on the ground that the said documents are, as appear from their description or nature, privileged from production.
3. To the best of the Defendant's knowledge at this juncture, neither the Defendant nor their solicitors nor any other person on their behalf, has now, or ever had, in its possession, custody or power any document of any description whatsoever relating to any matter in question in this action, other than the documents enumerated in the Schedule 1 hereto. If there are further documents relating to any matter in question in this action which comes into the Defendant's possession, custody or power and / or are found to be relevant by the Defendant due to subsequent discovery or otherwise, these documents will be disclosed in a further Supplementary List.

SCHEDULE 1**PART I**

S/No.	Date	Description (Copies unless otherwise stated)
1.	1982	A paper entitled " <i>The kinetics of the aggregation of nitrogen atoms in diamond</i> " - T.Evans and Zundu Qi; Proceedings of the Royal Society of London A, Vol. 381, pp. 159 - 179
2.	1990	A paper entitled: ' <i>Selective Deposition of Homoepitaxial diamond film</i> ' by S.A. Grot, C.W. Hatfield, G.SH. Gildenblat, A.R. Badzian & T. Badzian, Proc. 2nd Int'l Conf. on Elec. Mats, Material Research Society
3.	21 August 1990	US Patent No. 4,950,625
4.	30 January 1992	A paper entitled " <i>Dislocation of epitaxial CVD Diamond and the characterization by Raman spectroscopy</i> " - Masahiko Mitsuhashi, Shiro Karasawa, Sieshiro Ohya and Fumitaka Togashi; Applied Surface Science, Vol. 60/61, pp. 565-572
5.	7 July 1992	US Patent No. 5,127,983
6.	2 August 1994	US Patent No. 5,335,245
7.	1995	A paper entitled: ' <i>Characterization of Thick Homoepitaxial Film on Diamond (001) Substrate II</i> ' – T.Tsuno JNDF 9th Diamond Symposium, no. p09
8.	November 1996	A paper entitled " <i>High-pressure synthesis of high-purity diamond crystal</i> " – H. Sumiya and S. Satoh; Diamond and Related Materials; Vol. 5 Issue 11, pp. 1359 – 1365
9.	25 March 1999	An article entitled; "L.K.I. Co., " <i>The American Trader making process of changing the colour and gloss of natural diamond</i> ", Jayantilal Shah, Maniratna, 13 April 1999 based on a press release from Pegasus Overseas Limited, Lazare Kaplan International and General Electric Company published on 25 March 1999
10.	2000	A paper entitled ' <i>Development of large size diamond synthesis process</i> ' by Sumitomo Electric Industrial Co. Ltd., Report on R&D on "Frontier Carbon Technology" (FCT) project by New Energy Development Organisation (NEDO)

S/No.	Date	Description (Copies unless otherwise stated)
11.	1 August 2000	US Patent No. 6,096,129
12.	Fall 2000	A paper entitled: ' <i>GE POL Diamonds: Before and After</i> ' – Christopher P. Smith, George Bosshart, Johann Ponahlo, Vera M. F. Hammer, Helmut Klapper and Karl Schmetzer, <i>Gems & Gemology</i> , Vol. 36 Issue 3, pp. 192-215
13.	2001	A chapter in the textbook entitled: ' <i>Optical Properties of Diamond A Data Handbook</i> ' – Dr. Sc. Alexander M. Zaitsev, Chapter 5: 'Optical Electronic Transition', page 125 – 372
14.	2001	A paper entitled: 'The colour of diamond and how it may be changed' – Alan T. Collins, <i>Journal of Gemmology</i> , 2001, 27, 6, 341-359
15.	4 October 2001	International Publication No. WO 2001/72404
16.	20 December 2001	International Publication No. WO 2001/019633
17.	6 March 2002	A report by the RD42 Collaboration entitled: ' <i>Development of Diamond Tracking Detectors for High Luminosity Experiments at the LHC</i> '
18.	10 July 2002 (date of presentation)	A presentation by Dr Harris Kagan entitled " <i>Development of CVD Diamond Detectors for the LHC</i> "
19.	20 September 2002 (date of priority)	Singapore Patent No. 110506
20.	30 January 2003 (date of presentation)	A presentation by Dr Harris Kagan entitled " <i>Recent Developments in Diamond Detectors</i> "
21.	Spring 2003	A paper entitled: ' <i>Chemical Vapor Deposited Diamond Maturity and Diversity</i> ' – James E. Butler; <i>The Electrochemical Society Interface</i> , pp. 22-26
22.	10 April 2003 (date of	A presentation by Dr Harris Kagan entitled " <i>Particle Detectors: New Results on CVD Diamond Detectors</i> "

SNo.	Date	Description (Copies unless otherwise stated)
	presentation)	
23.	27 June 2003 (date of presentation)	A presentation by Dr Harris Kagan entitled " <i>Recent Developments in Diamond Tracking Devices</i> "
24.	15 - 19 September 2003 (date of presentation)	A presentation by Dr Harris Kagan entitled " <i>Diamond Detectors</i> "
25.	29 September 2003 (date of presentation)	A presentation by Dr Harris Kagan entitled " <i>Non-silicon Solid State Detectors</i> "
26.	25 November 2003	A report by the RD42 Collaboration entitled: ' <i>Development of Diamond Tracking Detectors for High Luminosity Experiments at the LHC</i> '
27.	26 November 2003 (date of presentation)	A presentation by Dr P. Weilhammer entitled " <i>Development of CVD Diamond Tracking Detectors for Experiments at High Luminosity Colliders</i> " for the RD42 Collaboration
28.	1 April 2004	International Publication No. WO 2004/027123
29.	1 - 2 April 2004 (date of presentation)	A presentation by Dr Mara Bruzzi entitled " <i>Status of the Development of Ultra Radiation-Hard Semiconductor Detectors for Very High Luminosity Colliders</i> "
30.	Spring, 2004	A paper entitled: ' <i>Identification of Synthetic Diamond Grown Using Chemical Vapor Deposition (CVD)</i> ' – Philip M. Martineau, Simon C. Lawson, Andy J. Taylor, Samantha J. Quinn, David J.F. Evans and Michael J. Crowder; <i>Gems & Gemology</i> , Vol. 40, No.1
31.	23 September 2004	International Publication No. WO 2004/082086
32.	1 April 2005	A report by the RD42 Collaboration entitled: ' <i>Report on E6 Samples, No. 1/2005</i> '
33.	6 April 2005	UK Patent No. 2400115C

S/No.	Date	Description (Copies unless otherwise stated)
34.	25 August 2005	Communication from the United Kingdom Patent Office to Element Six Limited in respect of UK Patent Application No. GB0506804.4
35.	13 October 2005	Communication from the United Kingdom Patent Office to Element Six Limited in respect of UK Patent Application No. GB0512114.0
36.	19 December 2005	Response by Element Six Limited to the United Kingdom Patent Office in respect of UK Patent Application No. GB00506804.4
37.	13 April 2006	Response by Element Six Limited to the United Kingdom Patent Office in respect of UK Patent Application No. GB0512114.0
38.	2 June 2006	Communication from the United Kingdom Patent Office to Element Six Limited in respect of UK Patent Application No. GB0512114.0
39.	2 October 2006	Response by Element Six Limited to the United Kingdom Patent Office in respect of UK Patent Application No. GB0512114.0
40.	30 November 2006	Communication from the United Kingdom Patent Office to Element Six Limited in respect of UK Patent Application No. GB0506804.4
41.	9 November 2006	International Publication No. WO 2006/117621
42.	5 December 2006	Communication from the United Kingdom Patent Office to Element Six Limited in respect of UK Patent Application No. GB0512114.0
43.	21 December 2006	Response by Element Six Limited to the United Kingdom Patent Office in respect of UK Patent Application No. GB00506804.4
44.	28 December 2006	International Publication No. WO 2006/136929
45.	5 February 2007	Response by Element Six Limited to the United Kingdom Patent Office in respect of UK Patent Application No. GB0512114.0
46.	21 February 2007	Request for Grant of a patent for UK Patent Application No. GB0703371.5

SNo.	Date	Description (Copies unless otherwise stated)
47.	21 March 2007	Communication from the United Kingdom Patent Office to Element Six Limited in respect of UK Patent Application No. GB0703371.5
48.	27 March 2007	Notification of Grant of UK Patent Application No. GB00506804.4 as UK Patent No. GB2409675
49.	16 April 2007	Response by Element Six Limited to United Kingdom Patent Office in respect of UK Patent Application No. GB0703371.5
50.	22 May 2007	Notification of Grant of UK Patent Application No. GB0512114.0 as UK Patent No. GB2411895
51.	12 June 2007	Notification of Grant of UK Patent Application No. GB0703371.5 as UK Patent No. GB2432592
52.	26 May 2009	Communication from the Japan Patent Office to Element Six Limited in respect of Japan Patent Application No. JPA2004-553030 (original and translated in English)
53.	25 August 2009	Communication from the Japan Patent Office to Element Six Limited in respect of Japan Patent Application No. JPA2005-538018 (original and translated in English)
54.	29 October 2009	Response by Element Six Limited to the Japan Patent Office in respect of Japan Patent Application No. JPA2004-553030 (original and translated in English)
55.	25 December 2009	Amendment to Japan Patent Application No. JPA2005-538018 filed by Element Six Limited (original)
56.	12 February 2010	Communication from the Japan Patent Office to Element Six Limited in respect of Japan Patent Application No. JPA2005-538018 (original and translated in English)
57.	20 August 2010	Communication from the Japan Patent Office to Element Six Limited in respect of Japan Patent Application No. JPA2005-538018 (original and translated in English)
58.	17 December 2010	Amendment to Japan Patent Application No. JPA2005-538018 filed by Element Six Limited (original) and Demand for Appeal (original and translated)
59.	21 May 2015	International Publication No. WO 2015/071484A1
60.	10 July 2014 (date filed)	United Kingdom Patent Office Patent Form 21 to register the assignment of, <i>inter alia</i> , UK Patent No. GB2411895

S/No.	Date	Description (Copies unless otherwise stated)
		and UK Patent No. 2432592
61.	5 May 2016 (date accessed)	Official Register of Japan Patent No. 4768267 (original and translated in English)
62.	20 September 2016 (date accessed)	Official Register of Japan Patent No. 4711677 (original)
63.	12 December 2016 (date accessed)	Printout of patent register for Singapore Patent No. 110506 from www.ipos.gov.sg

PART II

Cause papers, notes and instructions to the Defendant's solicitors and confidential communications between the Defendant and their solicitors and between solicitors and others with reference to the matters in question in this action for the purpose of obtaining legal advice and/or correspondence between the Defendant and/or their solicitors and third parties for the purposes of the present litigation; and without prejudice correspondence and communication.

NOTICE TO INSPECT

TAKE NOTICE that the documents in the above list, may be inspected at the office of the Solicitors of the abovenamed Defendant at 10 Collyer Quay, #10-00 Ocean Financial Centre, Singapore 049315, by prior appointment between the hours of 10.00am and 5.00 pm, on any working day within seven (7) days of service of this list on the Plaintiff or its solicitors.

Dated this 16 December 2016

A handwritten signature in black ink, appearing to read "Drew Napier", with a horizontal line extending to the right.

**DREW & NAPIER LLC
SOLICITORS FOR THE DEFENDANT**

To: The Plaintiff (and its solicitors)

Amica Law LLC

30 Raffles Place

#14-01 Chevron House

Singapore 048622

This is the Exhibit marked "SFW-36"

referred to in the Affidavit of

Susan Jane Fletcher Watts

affirmed in the United Kingdom

on this 27 day of March 2018

Before me



A NOTARY PUBLIC

RICHARD GARETH GRIFFITHS
Solicitor & Notary Public
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 Our Ref : JC/MP/NIC/20120280
 Your Ref : TY/MKJN/JYO/375178

18 December 2017

Drew & Napier LLC

10 Collyer Quay
 #10-01 Ocean Financial Centre
 Singapore 049315

BY FAX & POST

Fax No.: 6535 4906
 No. of pages: 12

Attention: Mr Tony Yeo / Ms Meryl Koh / Mr Javier Yeo

Dear Sirs

HC/S 26 of 2016**REQUEST FOR SPECIFIC DISCOVERY AND ELECTRONIC DISCOVERY**

1. We refer to our client's Statement of Claim (Amendment No.1), Reply and Defence to Counterclaim (Amendment No.3). We also refer to your client's List of Documents dated 7 October 2016 ("**DLOD**") and Supplementary List of Documents dated 16 December 2016 ("**DSLOD**").
2. Our client has pleaded that your client has infringed the '872 Patent and the '508 Patent. In relation to the '872 Patent, infringement of both its process claims as well as its product claims (as evidenced by Samples 1-4) are pleaded. However, we note that in your client's DLOD and DSLOD, your client has not exhibited any documents that would be relevant to the Plaintiff's case on infringement.
3. Accordingly, please file a supplementary list of documents and provide us with copies of all documents in your client's possession, custody or control that relate to the specific documents and/or categories of documents listed in the enclosed Annex A. Please make it clear in the supplementary list of documents which category each enumerated document belongs to.
4. Please let us have the said documents within 14 days hereof, failing which our client will take up the necessary application to Court against your client.
5. Additionally, our client takes the view that some of your client's discovery obligations might be more suited to electronic discovery (i.e. keyword searches). In the spirit of collaboration, we have drafted an Electronic Discovery Protocol which is enclosed in Annex B. Please let us know whether your client is agreeable to the same, including any comments thereto, by within 14 days hereof.

6. All of our client's rights are expressly reserved.

Yours faithfully

A handwritten signature in black ink, appearing to read "Amica". The signature is stylized with a large, sweeping initial letter 'A' and a cursive 'm'.

cc client
enc.

Annex A

Categories of documents

1. All R&D reports, material characterization reports and quality control documents which relate to the measurement of birefringence for single crystal CVD diamond material in any form, including as-grown, gemstone and diamond plate, wherein:
 - a. the measured material has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm;
 - b. the measured material was made, at least in part, by the Defendant in Singapore in the period of 2012 to date; and
 - c. the measured material has an optical birefringence such that the modulus of the sine of the phase shift, $|\sin \delta|$, for at least 98% of the analysed area of the sample remains in the first order (δ does not exceed $\pi/2$) and the $|\sin \delta|$ does not exceed 0.9.
2. All R&D reports, material characterization reports and quality control documents which relate to the measurement of birefringence for single crystal CVD diamond material in any form, including as-grown, gemstone and diamond plate, wherein:
 - a. the measured material has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm;
 - b. the measured material was made, at least in part, by the Defendant in Singapore in the period of 2012 to date; and
 - c. the measured material has an optical birefringence such that, for 100% of the area analysed, the sample remains in the first order (δ does not exceed $\pi/2$) and the maximum value of $\Delta n_{\text{[average]}}$, the average value of the difference between the refractive index for light polarised parallel to the slow and fast axes averaged over the sample thickness, does not exceed 1.5×10^{-4} .
3. All documents relating to the measurement of optical absorption for the single crystal CVD diamond material identified in Categories 1 or 2 above wherein:
 - a. the measured material has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm;
 - b. the measured material was made, at least in part, by the Defendant in Singapore in the period of 2012 to date; and
 - c. the measurement was made at a wavelength of 1.06 μm ;
 - d. the measured material has an optical absorption coefficient of less than 0.09 cm^{-1} .
4. All documents relating to the measurement of nitrogen concentration in single substitutional form for the single crystal CVD diamond material identified in Categories 1 or 2 above wherein:
 - a. the measured material has dimensions of at least 1.3 mm x 1.3 mm x 0.5 mm;
 - b. the measured material was made, at least in part, by the Defendant in Singapore in the period of 2012 to date; and
 - c. the measured material contains more than $3 \times 10^{15} \text{ atoms/cm}^3 \text{ N}$ but less than $5 \times 10^{17} \text{ atoms/cm}^3 \text{ N}$ in single substitutional form as measured by EPR.

5. Documents in the period 2012 to date relating to the Defendant's method(s) of heat treating single crystal CVD diamond material in any form, including as-grown, gemstone and diamond plate, at or above 1200°C, limited to:
 - a. process specification documents,
 - b. material characterization analyses,
 - c. diamond grading reports/certificates, and
 - d. product specification documents.
6. Documents relating to the research, development, conceptualisation and/or design of the method(s) disclosed pursuant to Category 5, limited to:
 - a. laboratory notebooks,
 - b. project proposals,
 - c. project reports,
 - d. product development reviews,
 - e. correspondence (e.g. emails) between management and researchers and correspondence between researchers, and
 - f. process revision documents.
7. Documents relating to the single crystal CVD diamond material in any form, including as-grown, gemstone and diamond plate, made by the Defendant in the period 16 October 2010 to 16 April 2012 and supplied by the Defendant directly or indirectly to Gemesis Diamond Company, Inc. in the period 16 October 2010 to 16 April 2012, and from which it may have been possible to make a gemstone having a weight of 0.40 ct, F colour and a VS2 clarity grade, limited to:
 - a. sales invoices,
 - b. purchase orders,
 - c. quotations,
 - d. marketing materials,
 - e. product specifications,
 - f. material characterization analyses, and
 - g. diamond grading reports/certificates.
8. Documents relating to the optical grade single crystal CVD diamond plates which are the subject of Ila quote no. 1314-121, limited to:
 - a. sales invoices,

- b. purchase orders,
 - c. quotations,
 - d. marketing materials,
 - e. product specifications, and
 - f. material characterization analyses.
9. Documents relating to the single crystal CVD diamond material in any form, including as-grown, gemstone and diamond plate, made by the Defendant in the period 27 April 2014 to 27 October 2015 and supplied by the Defendant directly or indirectly to Pure Grown Diamonds, Inc. in the period 27 April 2014 to 27 October 2015, and from which it may have been possible to make a gemstone having a weight of 0.38 ct, K colour and a VS1 clarity grade, limited to:
- a. sales invoices,
 - b. purchase orders,
 - c. quotations,
 - d. marketing materials,
 - e. product specifications,
 - f. material characterization analyses, and
 - g. diamond grading reports/certificates.
10. All documents relating to the making, disposal or offer to dispose of, importing, use and/or keeping whether for disposal or otherwise by the Defendant in Singapore of the diamond material having product code no. 2PCVD505005N and which was sold pursuant to Ila invoice no. Ila/INV/1516-0241, limited to:
- a. product specification documents;
 - b. material characterization analyses,
 - c. sales invoices, quotations and marketing materials provided by the Defendant to third parties,
 - d. importation documentation, and
 - e. inventory lists.
11. Documents in the period 2012 to date relating to the Defendant's method(s) of manufacturing the diamond material having product code no. 2PCVD505005N and which was sold pursuant to Ila invoice no. Ila/INV/1516-0241, including but not limited to:
- a. process specification documents,
 - b. CVD synthesis run sheets,

- c. quality control records,
 - d. documents specifying surface preparation of substrates pre-synthesis, and any subsequent characterisation (by selection or otherwise), and
 - e. documents specifying the level of nitrogen in the synthesis atmosphere and the method by which this is controlled.
12. Documents relating to the research, development, conceptualisation and/or design of the method(s) disclosed pursuant to Category 11 above, limited to:
- a. laboratory notebooks,
 - b. project proposals,
 - c. project reports,
 - d. product development reviews,
 - e. correspondence (e.g. emails) between management and researchers and correspondence between researchers, and
 - f. process revision documents.
13. All official documents relating to the incorporation of "Ila Holdings Group" and/or "Ila Holdings Group Limited" as issued by the relevant regulatory authority, including but not limited to certificates of incorporation.

Specific documents

14. Ila Quote No. 1314-121

Note:

- "supplied directly", as used in requests 7 and 9, means the provision of goods (whether for consideration or otherwise) to a third party wherein ownership of said goods pass from the supplier to the third party without any other party acquiring ownership of said goods in between, regardless of whether the condition/characteristics of said goods changed from the time it left the supplier's possession power and/or custody by, for example, cutting, polishing annealing, doping, irradiation or otherwise.
- "supplied...indirectly", as used in requests 7 and 9, means the provision of goods (whether for consideration or otherwise) to a third party wherein ownership of said goods pass to one or more entities before being acquired by said third party, regardless of whether the supplier intended said third party to acquire ownership of said goods and regardless of whether the condition/characteristics of said goods changed from the time it left the supplier's possession power and/or custody by, for example, cutting, polishing annealing, doping, irradiation or otherwise.

Annex B

ELECTRONIC DISCOVERY PROTOCOL

1. Service Provider

The parties agree that Litigation Edge Pte Ltd ("**Service Provider**") will be appointed to execute the searches referred to in paragraph 4 using the search engine and parameters specified in paragraph 2 below. Parties will bear Service Provider's costs equally.

2. Search Engine

The parties agree that Nuix ("**Software**") is to be used to conduct the aforementioned keyword searches. The preparation of the Software prior to conducting the searches (e.g. updating the search index or causing a fresh search index to be made) and any other search parameters not specified and agreed to herein are subject to further agreement between the parties, pending discussions between the parties and the Service Provider.

3. Scope of electronic discovery

- a. Discovery of the following class or classes of electronically stored documents shall be given ("**Repositories**"):
 - i. All email servers, cloud servers and network drives currently in the Defendant's custody, power, control and/or possession.
- b. The Defendant shall take reasonable steps to decrypt encrypted files or encrypted storage locations, media or devices in order to identify discoverable electronically stored documents. This may include taking reasonable steps to obtain the decryption code and/or using reasonable technical means to perform decryption of the encrypted files or encrypted storage locations, media or devices.
- c. For the avoidance of doubt, electronically stored documents residing in folders or directories in storage locations, media or devices, including folders or directories where temporarily deleted files are located (for example the Recycle Bin folder or Trash folder) are within the scope of discovery. Electronically stored documents that are (i) not reasonably accessible, for example deleted files or file fragments containing information which are recoverable through the use of computer forensic tools or techniques during a forensic inspection of the unallocated file space or file slack, (ii) files and folders which are not known to the party giving discovery to be hidden in the file system, and (iii) documents archived using backup software and stored off-line on backup tapes or other storage media are not within the scope of discovery.

4. Process for electronic discovery

- a. The Defendant shall transfer all electronically stored documents in the Repositories to Service Provider for indexing by the Software.
- b. **Reasonable search.** The search terms or phrases specified in the second column will be used by Service Provider in the conduct of a reasonable search of the Repositories for

relevant electronically stored documents. The reasonable search will be limited by the scope described in the third column.

Search No.	Search Terms	Scope
1	"LG*10061905"	Documents that were created in the period 16 April 2010 and 16 April 2013
2	"INV*REF*01*JAN*12*31"	Documents that were created in the period 16 March 2012 and 16 March 2013
3	"100005382"	Documents that were created in the period 16 March 2012 and 16 March 2013
4	"2*PCVD*303004N"	Documents that were created in the period 12 May 2013 and 12 May 2015
5	"3086"	Documents that were created in the period 12 April 2014 and 12 April 2015
6	"13*2051"	Documents that were created in the period 24 January 2014 and 24 January 2015
7	"1314*121"	Documents that were created in the period 24 February 2013 and 24 February 2015
8	"LG*10226420"	Documents that were created in the period 27 October 2014 to 27 October 2016
9	"1510*00178"	Documents that were created in the period 27 September 2015 to 27 September 2016

Under the Search Terms column in the above table, "*" means a single wildcard character. For example, LG*10061905 will match with *inter alia* LG10061905, LG 10061905, LG-10061905, and LG/10061905 etc.

- c. **Data sampling.** The Plaintiff shall review the search results within seven (7) days of being provided with the same; and within a further seven (7) days, parties shall meet to discuss whether the keywords and/or the Repositories need to be revised. Data sampling in accordance with the terms of this sub-paragraph shall be performed no more than twice.
- d. After the final revisions of the keywords and/or the Repositories (if any), the Defendant will disclose the documents disclosed by the final search in a supplementary list of documents in accordance with paragraph 5.

5. Format of list

The supplementary list of documents shall categorise and list electronically stored documents separately from documents in printed or other form. The list of documents enumerating electronically stored documents shall include the following columns: *[contents of table for illustration]*

Date Created	Description	File name & location	File format	Search No.
12 October 2013	Distribution agreement with Microwave Enterprises Inc.	//Contract Documents/Contract_M E.doc	Microsoft Word 2007	5

An index of documents enumerated in the list of documents shall be provided in an electronic spreadsheet in the Excel Workbook (.xlsx) file format.

6. Review for privileged material

The Defendant's obligation to conduct a reasonable search is fulfilled upon the Defendant carrying out the search to the extent agreed in this protocol; the Defendant shall not be required to review the search results for relevance.

Nothing in this protocol shall prevent the Defendant from reviewing the documents in any list provided hereunder for the purpose of claiming privilege. If the Defendant claims privilege over any document or record, it shall list the electronic documents or class of electronic documents over which privilege is claimed in the list of documents.

7. Inspection and copies

- a. **Arrangements for inspection.** The place for inspection of discoverable electronic documents should be stated separately if it is different from the place for inspection of other discoverable documents. If the Plaintiff intends to inspect through or with the assistance of its appointed computer expert, such computer expert shall provide an undertaking of confidentiality to the party giving inspection before he commences his inspection.
- b. **Supply of copies.** During inspection, copies shall not be taken. If copies are required, a request should be made. Electronic copies of discoverable documents will be supplied in their native format in a searchable form and in read-only optical discs upon request. Electronic copies of discoverable documents where privilege is claimed only with respect to their internally stored metadata information will be supplied in the Tagged Image File Format

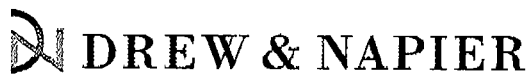
(or TIFF) with privileged metadata information removed. For each of the read-only optical discs supplied, a further list stating the storage format version of the optical disc and enumerating the list of electronic documents stored therein shall be provided.

8. Inadvertent disclosure of privileged documents

Notwithstanding compliance with the procedures in this plan, nothing in this plan is intended to be or shall be taken to amount to a waiver of privilege.

9. Discovery and production only if necessary

For the avoidance of doubt, nothing in this plan shall compel any party to give discovery of any document or produce any document for inspection which is not otherwise discoverable under Order 24, Rules 7 or 13 of the Rules of Court (Cap 322, R5).



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meryl.koh@drewnapier.com
javier.yeo@drewnapier.com

22 December 2017

BY FAX (6303 6222) AND POST
No. of pages: 2

AMICA LAW LLC
30 Raffles Place #14-01
Chevron House
Singapore 048622

Our Ref
TY/MKJN/JYO/375178

Your Ref
JC/MP/NIC/20120280

Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong

Dear Sirs,

HC/S 26/2016
EXTENSION OF TIME

1. We refer to your letter to us dated 18 December 2017 wherein your client had requested for specific discovery of 14 categories of documents from our client as well as for electronic discovery of documents based on 9 different keyword searches ("**Specific Discovery Letter**"). We also refer to the 17 interrogatories issued and served on us on 18 December 2017 ("**Interrogatories**").

2. First, your client's demand for our client to provide your client with the requested documents within 14 days of the date of the Specific Discovery Letter (i.e. to provide by 2 January 2018 as 1 January 2018 is a non-working day) is unreasonable. Your client would no doubt be aware that it is currently the holiday season and it would be impossible for us to take proper instructions from our client given that most of our client's management, staff and employees will be on leave and in any event, our client would not have sufficient time to review your numerous requests, let alone discuss the same with us. In particular, we are instructed that our client's representatives and employees involved in the conduct of this matter will only return to office on or around 8 January 2018. Our client's Chief Executive Officer Mr Vishal Mehta Jatin is also presently overseas and will only return to Singapore on or around 8 January 2018.

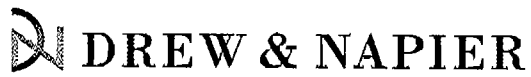
3. In the same vein, your client's request for our client to respond to its Interrogatories within 14 days (i.e. by 2 January 2018 as 1 January 2018 is a non-working day) is unreasonable as well. Furthermore, in your client's Interrogatories, your client has requested for our client's Mr Vishal Mehta Jatin, who as stated, will only return to Singapore on or around 8 January 2018, to provide the answers to the Interrogatories. Again, in any event, we would require time to review and take our client's instructions on your client's numerous Interrogatories as well.

4. In the premises, please let us know by **Tuesday, 26 December 2017** if your client is agreeable to an extension of the timelines, on the basis of reciprocity, as follows:-

- a. For our client to respond to your client's Specific Discovery Letter by 14 February 2018;
- b. For our client to respond to your client's Interrogatories by 14 February 2018; and

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22 December 2017
Page 2

-
- c. For the timeline for our client to apply for the Interrogatories to be varied or withdrawn pursuant to Order 26 Rule 3 of the Rules of Court to be extended to 31 January 2018.
5. We trust your client will find our client's requests at paragraph 4 above to be reasonable and fair.
6. All of our client's rights are expressly reserved.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Drew & Napier', written over the printed name of the firm.

Drew & Napier LLC

Cc client

www.amicalaw.com

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#14-01 Chevron House
Singapore 048622

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nicholas.ong@amicalaw.com
Our Ref : JC/MP/NIC/20120280
Your Ref : TY/MKJN/JYO/375178

26 December 2017

Drew & Napier LLC
10 Collyer Quay
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Singapore 049315

BY FAX (6535 4906) & POST

No. of page(s): 1
(including this page)

Attn: Mr Tony Yeo/ Ms Meryl Koh / Mr Javier Yeo

Dear Sirs

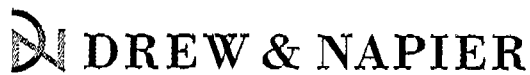
HC/S 26/2016

1. We refer to our letter dated 18 December 2017 and our interrogatories as filed on 18 December 2017 (collectively, the **"Request for Discovery and Interrogatories"**), as well as your letter dated 22 December 2017 (the **"Letter"**).
2. In our Request for Discovery and Interrogatories, our client had requested for the discovery documents as well as a response to interrogatories to be provided within 14 days of 18 December 2017, i.e. to provide by 2 January 2018 as 1 January 2018 is a non-working day. In your Letter, you had requested for an extension of timelines to 14 February 2018, which is more than 6 weeks from 2 January 2018.
3. We are instructed that our client is unable to agree to your client's request as it believes that the usual timeframe of 14 days from the date of service of the Request for Discovery and Interrogatories is reasonably sufficient for your client to consider whether it is willing to disclose the documentation and/or information requested.
4. In the event your client is agreeable to disclosure of the documents and/or information requested however, our client is amendable to a short further extension of time of the relevant timeline(s), to be further determined after receipt of your client's agreement, for your client to collate and provide the necessary documents and/or information.
5. All of our client's rights are hereby expressly reserved.

Yours faithfully



cc client



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22 January 2018

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Chevron House
Singapore 048622

Our Ref
TY/MKJN/JYO/375178

Your Ref
JC/MP/NIC/20120280

Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong

Dear Sirs,

HC/S 26/2016
SPECIFIC DISCOVERY

1. We refer to your letter dated 18 December 2017 with your client's request for specific discovery of various categories of documents as well as discovery of documents based on keyword searches via electronic discovery ("**18 December Letter**"), and the directions given by the Learned Assistant Registrar Ms Cheng Pei Feng ("**AR Cheng**") at the Pre-Trial Conference heard on 27 December 2017 ("**PTC**").
2. Further to AR Cheng's directions at the PTC, we set out our client's preliminary response to your client's requests:-
 - a. With respect to categories 1, 2, 3, and 4 of Annex A of your 18 December Letter, the categories of documents are too broad and are irrelevant.
 - b. With respect to categories 5 and 6 of Annex A of your 18 December Letter, the categories of documents are too broad, would include irrelevant matters and are oppressive.
 - c. With respect to category 7 of Annex A of your 18 December Letter, our client does not have any document in its possession, custody and/or power that falls within the description in category 7.
 - d. We are still taking our client's instructions on your client's requests at categories 8 and 14 of Annex A of your 18 December Letter but to the extent that any documents in these categories are relevant and necessary (which is not admitted), our client is agreeable to disclose.
 - e. With respect to category 9 of Annex A of your 18 December Letter, we are instructed that our client does not have any document in its possession, custody and/or power that falls within the description in category 9.

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22 January 2018

Page 2

- f. With respect to category 10 of Annex A of your 18 December Letter, we are instructed as follows:-
- i. Our client does not have any document described in subparagraphs (a), (b) and "marketing materials provided by the Defendant to third parties" as referred to in subparagraph (c) in its possession, custody and/or power.
 - ii. With respect to the "sales invoices, quotation" referred to in subparagraph (c), our client does not have any further documents in its possession, custody and/or power save for the documents already disclosed to and/or by your client.
 - iii. With respect to subparagraphs (d) and (e), these are irrelevant and in any event, our client does not have any document in its possession, custody and/or power that falls within the description in the aforementioned categories.
- g. With respect to category 11 of Annex A of your 18 December Letter, we are instructed that our client does not have any document in its possession, custody and/or power that falls within the description in subparagraphs (a), (c) and (e). We are still taking our client's instructions on your client's request at subparagraphs (b) and (d) but to the extent that any documents in these categories are relevant and necessary (which is not admitted), our client is agreeable to disclose, but only **on the condition that your client executes the relevant confidentiality undertakings prior to such disclosure**. Our client further reserves its right to redact irrelevant information from any document that falls within subparagraphs (b) and (d) (if any).
- h. With respect to category 12 of Annex A of your 18 December Letter, this category of documents is extremely broad and is a request for documents that are irrelevant. In any event, we have been instructed that our client does not have any document in its possession, custody and/or power that falls within the description in category 12.
- i. With respect to category 13 of Annex A of your 18 December Letter, we are instructed that our client does not have any document in its possession, custody and/or power that falls within the description in category 12.
3. With respect to your client's request for electronic discovery, our client objects to your client's request in its entirety. It is clear that the keyword searches proposed by your client at paragraph 4(b) of Annex B of your 18 December Letter completely overlaps with the documents your client had requested for at Annex A. Further, our client does not see how electronic discovery in the present proceedings, especially given your client's proposed keyword searches, is useful and/or necessary given the high costs involved. Accordingly, it is a waste of time and costs for both parties to conduct electronic discovery, again especially in light of the more specific requests set out at Annex A of your 18 December Letter.
4. All of our client's rights are expressly reserved.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Drew & Napier', written over a horizontal line.

Drew & Napier LLC

Cc client

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 Our Ref : JC/MP/NIC/20120280
 Your Ref : TY/MKJN/VHWS/375178

26 January 2018

Drew & Napier LLC

10 Collyer Quay
 #10-01 Ocean Financial Centre
 Singapore 049315

BY FAX & POST

Fax No.: 6535 4906
 No. of pages: 2

Attention: Mr Tony Yeo / Ms Meryl Koh / Mr Javier Yeo

Dear Sirs

HC/S 26/2016**SPECIFIC DISCOVERY**

1. We refer to our letter dated 18 December 2017 and your letter dated 22 January 2018 ("Letter").
2. Preliminarily, our client objects to your client's blatant disregard for timelines set down by the Court. At the PTC on 27 December 2017, the learned AR Cheng Pei Feng had set down a deadline of 22 January 2018 for your client to provide us with its preliminary responses. This gave your client more than sufficient time to consider the various specific discovery requests. Our client was therefore taken by surprise when on 22 January 2018, we received your Letter stating that you are still "taking instructions" in relation to numerous discovery requests. Indeed, no advance warning or request for an extension of time was received by us.
3. Be that as it may, we refer specifically to paragraph 2(d) and (g) of your Letter. Please let us have your client's *final* response on whether it agrees to provide the documents under Categories 8, 14, and 11(b) and (d). Insofar as such documents contain confidential information, our client is willing to execute an appropriate confidentiality undertaking.
4. We refer specifically to paragraphs 2(c) and (e)-(i) of your Letter. Please let us know whether your client is agreeable to affirming by way of an affidavit that it does not have any document under Categories 7, 9, 10, 11(a),(c) and (e), 12, and 13 in its possession, custody and/or power, excluding documents that have already been disclosed in the parties' respective lists of documents and supplementary lists of documents.
5. Please let us have your client's response to paragraphs 3-4 above by **5 February 2018**.

6. All of our client's rights are hereby expressly reserved.

Yours faithfully

A handwritten signature in black ink, appearing to read "Amica", is written over a light gray rectangular background.

cc client

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 Our Ref : JC/MP/NIC/20120280
 Your Ref : TY/MKJN/VHWS/375178

6 February 2018

Drew & Napier LLC

10 Collyer Quay
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 Singapore 049315

BY FAX & POST

Fax No.: 6535 4906
 No. of pages: 1

Attention: Mr Tony Yeo / Ms Meryl Koh / Mr Javier Yeo

Dear Sirs

HC/S 26/2016**SPECIFIC DISCOVERY AND INTERROGATORIES**

1. We refer to our letters dated 22 January 2018 and 26 January 2018, and your letter dated 22 January 2018.
2. Our letter dated 22 January 2018 is our preliminary response to the Defendant's request for documents. We have yet to hear from you regarding our proposal at paragraph 18 of our letter, despite more than two weeks having elapsed.
3. Our letter dated 26 January 2018 relates to the Plaintiff's request for documents. We have yet to hear from you regarding our proposals at paragraphs 3-4 of our letter, despite requesting the same by 5 February 2018.
4. Your letter dated 22 January 2018 is your client's preliminary response to the interrogatories filed by the Plaintiff on 18 December 2017. In said letter, your client agreed to answer interrogatories 1(a), 6(a), 11(a) and 17(a). However, your client has yet to file its answers, despite the deadline of 5 February 2018 set by AR Cheng Pei Feng having passed.
5. Please let us have your responses/answers as specified in paragraphs 2-4 above as soon as possible, and in any event, no later than **4pm on 9 February 2018**.
6. All of our client's rights are hereby expressly reserved.

Yours faithfully



cc client



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Our Ref
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Your Ref
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12 February 2018

BY FAX (6303 6222) AND POST
No. of pages: 1

AMICA LAW LLC
30 Raffles Place #14-01
Chevron House
Singapore 048622

Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong

Dear Sirs,

HC/S 26/2016
SPECIFIC DISCOVERY

1. We refer to your letter to us dated 26 January 2018.
2. We do not wish to litigate by correspondence. For the record, our client denies and objects to your client's allegation at paragraph 2. It is clear from paragraphs 2(d) and 2(g) of our letter that our client agrees to disclose documents falling within the categories 8, 14, 11(b) and 11(d) only insofar as these are relevant and necessary.
3. In any event, we set out our client's response on the said categories below:-
 - a. With respect to categories 8 and 14 of your letter to us dated 18 December 2017, our client is agreeable to disclosing documents described at categories 8(a), 8(b), 8(c) and 14. With respect to the other sub-paragraphs in category 8, we are instructed that our client does not have these documents in its possession, custody and/or power.
 - b. With respect to categories 11(b) and 11(d), we are instructed that our client does not have these documents in its possession, custody and/or power.
4. With respect to your client's request at paragraph 4, our client agrees to file the affidavit at the appropriate time.
5. All of our client's rights are expressly reserved.

Yours faithfully,

Drew & Napier LLC

Cc client

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 Our Ref : JC/MP/NIC/20120280
 Your Ref : TY/MKJN/JYO/375178

14 February 2018

Drew & Napier LLC
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 Singapore 049315

BY FAX (6535 4906) & POST

No. of page(s): 3
 (including this page)

Attention: Mr Tony Yeo / Ms Meryl Koh / Mr Javier Yeo

Dear Sirs

HC/S 26 of 2016

1. We refer to your letters dated 22 January 2018 (your "**22 Jan Letter**") and 12 February 2018 (your "**12 Feb Letter**") and our letter dated 26 January 2018 (our "**26 Jan Letter**").

Affidavit

2. At paragraph 3(a)-(b) of your 12 Feb Letter, it was stated that your client does not have documents under Categories 8(d)-(f), 11(b) and 11(d) in its possession, custody and/or power. In respect of these categories of documents, please let us know the following:-
 - a. whether your client is agreeable to affirming by way of an affidavit that it does not have these categories of documents in its possession, custody and/or power; and
 - b. whether your client is agreeable to including in its affidavit:
 - i. whether these categories of documents have, respectively and at any time, been in its possession, custody or power; and
 - ii. if not then in its possession, custody or power, when it parted with these categories of documents and what has become of them, respectively.
3. At paragraph 4 of your 12 Feb Letter, your client has also agreed to affirm by way of an affidavit that it does not have any document under Categories 7, 9, 10, 11(a),(c) and (e), 12, and 13 in its

possession custody and/or power, excluding documents that have already been disclosed in the parties' respective lists of documents and supplementary lists of documents. In respect of these categories of documents, please let us know the following:-

- a. whether your client is agreeable to including in its affidavit:
 - i. whether these categories of documents have, respectively and at any time, been in its possession, custody or power; and
 - ii. if not then in its possession, custody or power, when it parted with these categories of documents and what has become of them, respectively.

Extension of Time

4. We refer to the Pre-Trial Conference ("PTC") held on 27 December 2017 before Assistant Registrar Ms Cheng Pei Feng ("**AR Cheng**"), where she provided the following directions:
 - a. Parties to provide their preliminary responses (i.e. whether the other side is entitled to the documents or information requested for) by **22 January 2018**;
 - b. Parties to provide substantive responses (if any) by **5 February 2018**; and
 - c. Parties to file their respective summons (if necessary) by **19 February 2018**.
5. We reiterate the point made in our 26 Jan Letter that your client has chosen to disregard timelines set by AR Cheng on 27 December 2017, i.e. by failing to provide preliminary responses to numerous discovery requests by 22 January 2018. In fact, our client only managed to know your client's preliminary responses to our client's discovery requests as late as 12 February 2018, 3 weeks after the 22 January 2018 timeline set by AR Cheng. Further, in your 12 Feb Letter, no reasonable explanation as to your client's delay was offered in respect of your client's failure to meet both of AR Cheng's 22 January 2018 and 5 February 2018 timelines.
6. The timelines provided by AR Cheng are premised on there being reasonable time of at least 2 weeks for parties to consider, at each stage, the other party's preliminary and substantive responses respectively so as to consider whether to file their respective summons, if necessary, by 19 February 2018.
7. As a result of the delay occasioned by your client, our client will require more time to consider whether to file an application for specific discovery, particularly since its decision may depend on your client's response(s) to its requests at paragraphs 2 and 3 above.
8. Given the circumstances, please let us know if your client is agreeable to a mutual extension of the 19 February 2018 timeline for parties to file their respective summons by one week, i.e. to 26 February 2018.

9. Pending your client's response, our client reserves its right to file its application for specific discovery on 19 February 2018 and to seek costs from your client for any wasted work done in respect of categories of documents for which a response from your client is still forthcoming.
10. All of our client's rights are expressly reserved.

Yours faithfully

A handwritten signature in dark ink, appearing to read "Amica", with a stylized, flowing script.

cc. Client



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14 February 2018

BY E-LITIGATION

No. of pages: 1

THE SUPREME COURT REGISTRY

Supreme Court of Singapore
1 Supreme Court Lane
Singapore 178879

Attn: The Learned Assistant Registrar Ms Cheng Pei Feng

Our Ref
TY/MKJN/JYO/375178

Your Ref

Dear Sirs,

HC/S 26/2016

TIMELINES FOR FILING SPECIFIC DISCOVERY APPLICATIONS

1. We act for the Defendant and Amica Law LLC ("AL") acts for the Plaintiff in the captioned matter.
2. We refer to the Pre-Trial Conference ("PTC") heard on 27 December 2017 at 3.30pm before the Learned Assistant Registrar Ms Cheng Pei Feng ("AR Cheng") where AR Cheng had directed, *inter alia*, for parties to file their respective discovery applications by Monday, 19 February 2018.
3. We write to inform AR Cheng that further to a series of correspondence between AL and us, parties will not be able to file the necessary specific discovery applications by Monday, 19 February 2018. AL has proposed for the deadline to be extended to Monday, 26 February 2018. We propose instead for this matter to be addressed and for new timelines to be directed at the next PTC, presently fixed for 21 February 2018 at 3.30pm.
4. We are grateful for this Honourable Court's indulgence to our request above at paragraph 3.
5. We look forward to this Honourable Court's direction on the above.

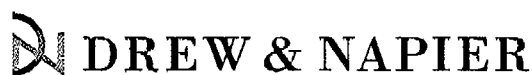
Yours faithfully,

Drew & Napier LLC

- cc. 1. Client
2. Amica Law LLC
By Fax Only (6303 6222)
Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong
(File Ref: JC/MP/NIC/20120280)

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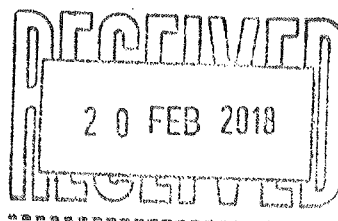
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Our Ref
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20 February 2018



BY FAX (6303 6222) AND POST
No. of pages: 4

AMICA LAW LLC
30 Raffles Place #14-01
Chevron House
Singapore 048622

Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong

Dear Sirs,

HC/S 26/2016
SPECIFIC DISCOVERY

1. We refer to our letters to you dated 12 February 2018 and 14 February 2018 respectively.
2. Pursuant to paragraph 3(a) of our letter to you dated 12 February 2018 and paragraph 8 of our letter to you dated 14 February 2018, we enclose copies of documents described at categories 8(a) to 8(c) and 14 of Annex A of your letter to us dated 18 December 2017.
3. All of our client's rights are expressly reserved.

Yours faithfully,

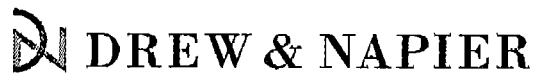
Drew & Napier LLC

Enc

Cc client

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Our Ref
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Your Ref
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28 February 2018

BY FAX (6303 6222) AND POST

AMICA LAW LLC
30 Raffles Place #14-01
Chevron House
Singapore 048622

Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong

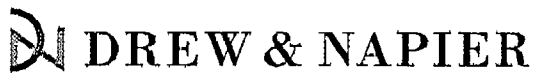
Dear Sirs,

**HC/S 26/2016
SPECIFIC DISCOVERY**

1. We refer to your letters to us dated 14 February 2018 ("**14 February 2018 Letter**") and 19 February 2018 ("**19 February 2018 Letter**"). We also refer to the Pre-Trial Conference ("**PTC**") heard on 21 February 2018 at 3.30pm before the Learned Assistant Registrar Ms Cheng Pei Feng ("**AR Cheng**").
2. With respect to paragraph 2(a) of your 14 February 2018 Letter, our client is agreeable to include in the affidavit referred to at paragraph 4 of our letter dated 12 February 2018 that it does not have in its possession, custody and/or power, documents falling within the said categories 8(d) – 8(f) and 11(b) and 11(d).
3. With respect to paragraphs 2(b) and 3(a) of your 14 February 2018 Letter, our client is agreeable to include its responses in the affidavit referred to at paragraph 4 of our letter dated 12 February 2018.
4. For the record, our client objects to the allegations raised at paragraph 5 of your 14 February 2018 Letter, viz, that our client failed to meet the timelines as directed by AR Cheng at the PTC heard on 27 December 2017 at 3.30pm.
5. As stated at paragraph 2 of our letter to you dated 12 February 2018, our client had already stated its position with respect to all of your client's requests for documents in our letter to you dated 22 January 2018. This is in accordance with the timelines as directed by AR Cheng. Our letter to you dated 12 February 2018 merely provided a further response for categories 8, 14, 11(b) and 11(d), viz, whether these documents are in our client's possession, custody and/or power. Accordingly, your client's allegations are baseless. It is completely untrue that your client "only managed to know [our] client's preliminary responses to [your] client's discovery request as late as 12 February 2018".
6. Further, our client's responses in our letter to you dated 22 January 2018 were sufficient for your client to decide if it was necessary to proceed with any specific discovery application(s) against our client. Any delay or omission on the part of your client in filing the application by 19 February 2018 is a result of your client's own inaction.

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28 February 2018

Page 2

7. As submitted at the PTC heard on 21 February 2018, it was your client who had failed to comply with AR Cheng's timelines as directed at the PTC heard on 27 December 2017: -

- (a) While your client has stated in your letter to us dated 22 January 2018 that it is agreeable to disclose documents falling within the said categories 3(a), 3(d), 3(g) to 3(i), albeit in the limited manner, none of these documents were forthcoming from your client despite AR Cheng's directions for parties to file their respective lists of documents enumerating the documents that they were willing to disclose by 5 February 2018. Indeed, AR Cheng commented at the PTC heard on 21 February 2018 that your client should not be waiting for our client's response before taking steps to source for the requisite documents and that it was "shocking" that as at 21 February 2018, your client had not approached any of the third parties to request for the documents that your client had already agreed to disclose since 22 January 2018.
- (b) It is also disingenuous for your client to claim that it is unable to provide the documents "given the ambiguity of [our client's] numerous discovery requests". This is no reason to withhold the documents that your client had already agreed to disclose since 22 January 2018. In fact, your client should have disclosed these documents in October 2016 when your client first disclosed the Technical Notes in the Plaintiff's List of Documents at S/Nos 136-139 and 145-148 given that your client agrees that these are relevant and necessary. It is evident that your client had deliberately delayed and is still delaying the disclosure of these documents.
- (c) It is also no excuse for your client to rely on the fact that it is incorporated outside of Singapore, in the United Kingdom, as a reason for requiring so much more time to procure the relevant and necessary documents. Your client chose to commence proceedings against our client in Singapore and should therefore be prepared to overcome any alleged inconveniences and alleged logistical difficulties.
- (d) Further, it is also no excuse to claim that the involvement of third parties made it difficult for your client to produce the documents in a timely fashion. In particular, the fact that third parties are involved does not justify your client's failure to even approach them early on, to request for the requisite documents. We repeat AR Cheng's comments on your client's conduct in this regard as stated at paragraph 7a above. Your client has clearly chosen to sit on its hands instead of diligently complying with its discovery obligations.

8. Our client reserves its rights to raise the above conduct at the appropriate forum.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Drew & Napier'.

DREW & NAPIER LLC

Cc: Client

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Our Ref : JC/MP/NIC/20120280
Your Ref : TY/MKJN/VHWS/375178

2 March 2018

Drew & Napier LLC

10 Collyer Quay
#10-01 Ocean Financial Centre
Singapore 049315

BY FAX & POST

Fax No.: 6535 4906
No. of pages: 1

Attention: Mr Tony Yeo / Ms Meryl Koh / Mr Javier Yeo

Dear Sirs

HC/S 26/2016**SPECIFIC DISCOVERY**

1. We refer to your letter dated 28 February 2018 ("Letter") regarding the Plaintiff's requests for specific discovery.
2. Kindly let us have the affidavit referred to at paragraphs 2-3 of your Letter ("Affidavit") by **13 March 2018**. This is to enable our client sufficient time to review and to consider whether it should discontinue some of its requests in its summons for specific discovery.
3. Given the deadline of 28 March 2018 for parties to file their applications for further discovery, your client's filing of the Affidavit in a timely manner is crucial to avoid expending unnecessary time and costs for both parties.
4. All of our client's rights are hereby expressly reserved, including its rights to seek discovery of any category of documents should your client fail to provide the Affidavit by 13 March 2018 or if the contents of the Affidavit are unsatisfactory, as well as to claim all costs thrown away against your client.

Yours faithfully



cc: client



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Our Ref
TY/MKJN/JYO/375178

Your Ref
JC/MP/NIC/20120280

13 March 2018

BY FAX (6303 6222) AND POST
No. of pages: 1

AMICA LAW LLC
30 Raffles Place #14-01
Chevron House
Singapore 048622

Attn: Mr Jason Chan / Mr Melvin Pang / Mr Nicholas Ong

Dear Sirs,

HC/S 26/2016
SPECIFIC DISCOVERY

1. We refer to your letter to us dated 2 March 2018.
2. Our client does not see the urgency for this affidavit to be filed prior to the 28 March 2018 deadline for parties to file their applications for specific discovery, especially in light of our client's responses in our letters to you dated 22 January 2018, 12 February 2018 and 28 February 2018 as well as our submissions made at the Pre-Trial Conference on 21 February 2018.
3. Our client reserves its rights on costs if your client insists on seeking discovery unnecessarily, for any category of documents, notwithstanding our aforementioned letters to you.

Yours faithfully,

Drew & Napier LLC

Cc client

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This is the Exhibit marked "SFW-37"

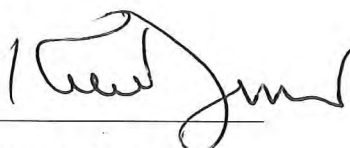
referred to in the Affidavit of

Susan Jane Fletcher Watts

affirmed in the United Kingdom

on this 27th day of March 2018

Before me

A handwritten signature in black ink, appearing to read 'Richard Griffiths', written over a horizontal line.

A NOTARY PUBLIC

RICHARD GARETH GRIFFITHS
Solicitor & Notary Public
Downend Lodge
Chieveley
ENGLAND RG20 8TN

Exhibit No.	Description	Page No.
37(a)	Analysis of Gemesis Gemstone NL530	124
37(b)	Summary of Evidence that NL530 had been Heat Treated (Annealed) after Growth	141
37(c)	Summary of Evidence that NL530 was Coloured Prior to Annealing	148
37(d)	Email attachment from Gemesis Diamond Company to Chuiguan Ng confirming Order #100005382	150
37(e)	Invoice from Gemesis Diamond Company for Product Code LG10061905	151
37(f)	Packing Slip #PL-5382 from Gemesis Diamond Company to Chuiguan Ng	152
37(g)	Letter HS Intellectual Property Services to Amica Law LLC	153
37(h)	International Gemological Institute Lab-Grown Diamond Report No. LG10061905	157
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TECHNICAL REPORT

Title: Analysis of Gemesis Gemstone NL530
Authors: Philip Martineau and Brad Cann
Date: 5 October 2016

1. SUMMARY

A Gemesis synthetic diamond round brilliant (NL530) with a weight of 0.40 ct, was examined at the DTC Research Centre (now De Beers Technologies UK). It was received with an IGI grading report (report number LG10061905) that indicated that IGI had given it F colour and VS2 clarity grades. The girdle of the stone was laser inscribed "GEMESIS CREATED LG10061905". The characteristics of this synthetic diamond round brilliant were very similar to those of Gemesis CVD synthetics we have examined in the past and also those of CVD synthetic diamond samples supplied by Gemesis Corp to the GIA [Wang et al. (2012) in *Gems and Gemology*, Vol. 48, No. 2, pp 80-97]. DiamondSure referred the synthetic diamond as type IIa, and DiamondPlus referred it as a CVD synthetic diamond due to the presence of the 737 nm photoluminescence line. DiamondView images provided evidence that the round brilliant was CVD synthetic in origin and that it had been annealed. Photoluminescence spectroscopy confirmed both of these findings and suggested that the annealing temperature was in the range 1900-2300°C. EPR spectroscopy showed that the synthetic diamond sample contained neutral single substitutional nitrogen at a concentration of 130(20) ppb when measured after heating in the dark and 160(20) ppb when measured after UV illumination. These measurements are consistent with those obtained using UV-visible absorption spectroscopy. A plate (with a thickness of 0.72 mm and weight 0.20 ct) was processed from the stone, leaving its girdle inscription intact in order to aid future verification of the sample. The absorption coefficient of the plate at 1.06 μm was found to be 0.024(3) cm^{-1} . Birefringence measurements were performed on the plate at Warwick University using a Metripol microscope. Only first order birefringence was observed and over a selected 1.3 mm x 1.3 mm area $\sin \delta$ and $|\sin \delta|$ do not exceed 0.352(20). Over a selected 2.5 mm x 2.5 mm area $\sin \delta$ and $|\sin \delta|$ do not exceed 0.573(20). For a 1.3 mm x 1.3 mm area the maximum Δn value was 4.69(30) $\times 10^{-5}$ and for a 2.5 mm x 2.5 mm area the maximum Δn was 7.96(30) $\times 10^{-5}$.

A round brilliant polished gemstone of 0.40 ct weight was received at the DTC Research Centre on 8th May 2012. It was assigned parcel number NL530. Along with the sample, documentation indicating its origin was supplied. This included an invoice and packing note from Gemesis (please see Figures 1 & 2) and an IGI certificate (Figure 3). The details of the sample are shown in Table 1.

Figure 1: Scanned copy of the invoice that was included with the Gemesis sample.



Table 1: Details of the Gemesis stone studied. * indicates on the invoice. ** indicates on packing slip. *** indicates on the IGI grading report.

The invoice shows an IGI grading report number. This comprised the letters LG (which might mean ‘laboratory grown’) followed by a sequence of numbers. The same IGI certificate number was present on the certificate.

INTERNATIONAL GEMOLOGICAL INSTITUTE

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LABORATORY GROWN DIAMOND REPORT

Red symbols denote internal characteristics (inclusions). Green or black symbols denote external characteristics (blemishes). Diagrams in this report are approximate representations of the stone and symbols shown indicate type, position, and approximate size of clarity characteristics. All clarity characteristics may not be shown. Details of inclusions are not shown.

DATE: 5/27/2011 REPORT NUMBER: LG10061905

DESCRIPTION: LABORATORY GROWN DIAMOND

SHAPE AND CUTTING STYLE: ROUND BRILLIANT CUT

MEASUREMENTS: 4.78 x 4.93 x 2.93 MM

GRADING RESULT:
Carat Weight: 0.40 CT(S)
Color Grade: F
Clarity Grade: VS2
Cut Grade: IDEAL

PROPORTIONS:
Depth: 60.9%
Table: 89%
Crown Height % - Ang: 14.0% - 33.0°
Pavilion Depth % - Ang: 44.0% - 41.3°
Girdle: THIN TO MEDIUM
Culet: NONE

FINISH:
Polish: VERY GOOD
Symmetry: VERY GOOD

FLUORESCENCE: NONE

COMMENTS: GIRDLE LASERSCRIBED "GEMESIS CREATED LG10061905".
THE LABORATORY GROWN DIAMOND DESCRIBED ABOVE IS CLASSIFIED AS A TYPE IIA.

PHOTO ENLARGED

COLOR GRADING SCALE	CLARITY (HR) GRADING SCALE
COLOURLESS D-F	FL FLAWLESS
NC NEAR COLOURLESS D-F	IF INTERNAL FLAWLESS
FT FAINT K-M	VVS VERY VERY SLIGHTLY INCLUDED
VLT VERY LIGHT N-Z	VS VERY SLIGHTLY INCLUDED
LT LIGHT S-Z	SI SLIGHTLY INCLUDED
	I INCLUDED

The laboratory grown diamond described in this Report ("Report") has been graded, tested, analysed, examined and/or inscribed by International Gemological Institute (I.G.I.). A laboratory grown diamond is one that has the same chemical, physical and optical properties as mined diamonds, with the exception of being grown by man. I.G.I. employs and utilizes those techniques and equipment currently available to I.G.I., including, without limitation, 10X magnification, corrected triplet loupe and binocular microscopy, master color comparison system, non-contact optical measuring device, and such other instruments and/or processes as deemed appropriate by I.G.I. This Report includes advanced security features. A duly accredited gemologist or jeweler can advise you with respect to the importance of and interrelationship between cut, color, clarity and carat weight.

THIS REPORT IS NEITHER A GUARANTEE, VALUATION NOR APPRAISAL OF THE LABORATORY GROWN DIAMOND DESCRIBED HEREIN.

© 2011 International Gemological Institute See Terms and Conditions on Reverse

Figure 3: Scanned copy of the IGI certificate that was included with the Gemesis sample

On the Gemesis invoice, the following declaration was present: "Disclosure: All diamonds from Gemesis are lab-created, guaranteeing a socially and ecologically responsible point of origin."

The IGI report specifies that the dimensions of the round brilliant are 4.78 mm x 4.93 mm x 2.93 mm.

The IGI report gives the description 'Laboratory Grown Diamond' and includes the comment: "Girdle laserscribed "Gemesis Created LG10061905". The report contains the following statement: "The laboratory grown diamond described in this Report ('Report') has been graded, tested, analysed, examined and/or inscribed by International Gemological Institute (I.G.I.) A laboratory grown diamond is one that has the same chemical, physical and optical properties as mined diamond, with the exception of being grown by man. I.G.I. employs and utilizes those techniques and equipment currently available to I.G.I., including, without limitation, 10X magnification, corrected triplet loupe and binocular microscopy, master color comparison system, non-contact-optical measuring device, and such other instruments and/or processes as deemed appropriate by I.G.I. This Report includes advanced security features. A duly accredited gemologist or jeweler can advise you with respect to the importance of and interrelationship between cut, color, clarity and carat weight."

RESULTS

3.1 Microscopy and birefringence images

Microscopy images were recorded (please see Figure 4). The gemstones were of good colour and cut but inclusions were visible and can be seen in the images in Figure 4.

The stone possessed a girdle inscription which was straightforward to locate and contained the words 'GEMESIS CREATED' followed by letter / number combination that correlated with the IGI certificate numbers. One of the images in Figure 4 shows the inscription.



Figure 4: Microscopy images for the Gemesis stone NL530, showing inclusions and the girdle inscription

3.2 *DiamondSure and DiamondPLus*

NL530 was tested using DiamondSure and DiamondPLus, instruments developed by De Beers Technologies and now sold by IIDGR. The results are shown in Table 2. DiamondPLus gave an average 737 nm Raman-normalised photoluminescence intensity value of 0.454. DiamondPLus uses 658 nm laser diode to excite this luminescence feature at 737 nm with the sample immersed in liquid nitrogen. The 737 nm photoluminescence line is commonly detected for CVD synthetic diamond.

Gemstone	DiamondSure results	DiamondPLUS results
NL530	'Refer for further tests (Type II)'	'Refer (CVD synthetic?) 737nm'

Table 2: DiamondSure and DiamondPLus results for the NL530 stone

3.3 *DiamondView images*

DiamondView fluorescence and phosphorescence images were recorded (Figure 5). NL530 exhibited bluish-green fluorescence and blue phosphorescence, a combination that we have commonly observed for nitrogen-doped CVD synthetics that have been high-temperature treated (between 1800 and 2300°C). Such a heat treatment is likely to have been performed to remove brown coloration, and as a consequence of the heat treatment the dominant colour of the fluorescence has been changed from the orange colour typical of as-grown nitrogen doped CVD synthetic diamond, to the observed bluish-green colour.

DiamondView fluorescence images of the sample show obvious striations that are indicative of differential uptake of defects on the risers and terraces of growth steps that were formed during the CVD diamond synthesis process. The presence of these striations provides evidence that the gemstones are CVD synthetic in origin.

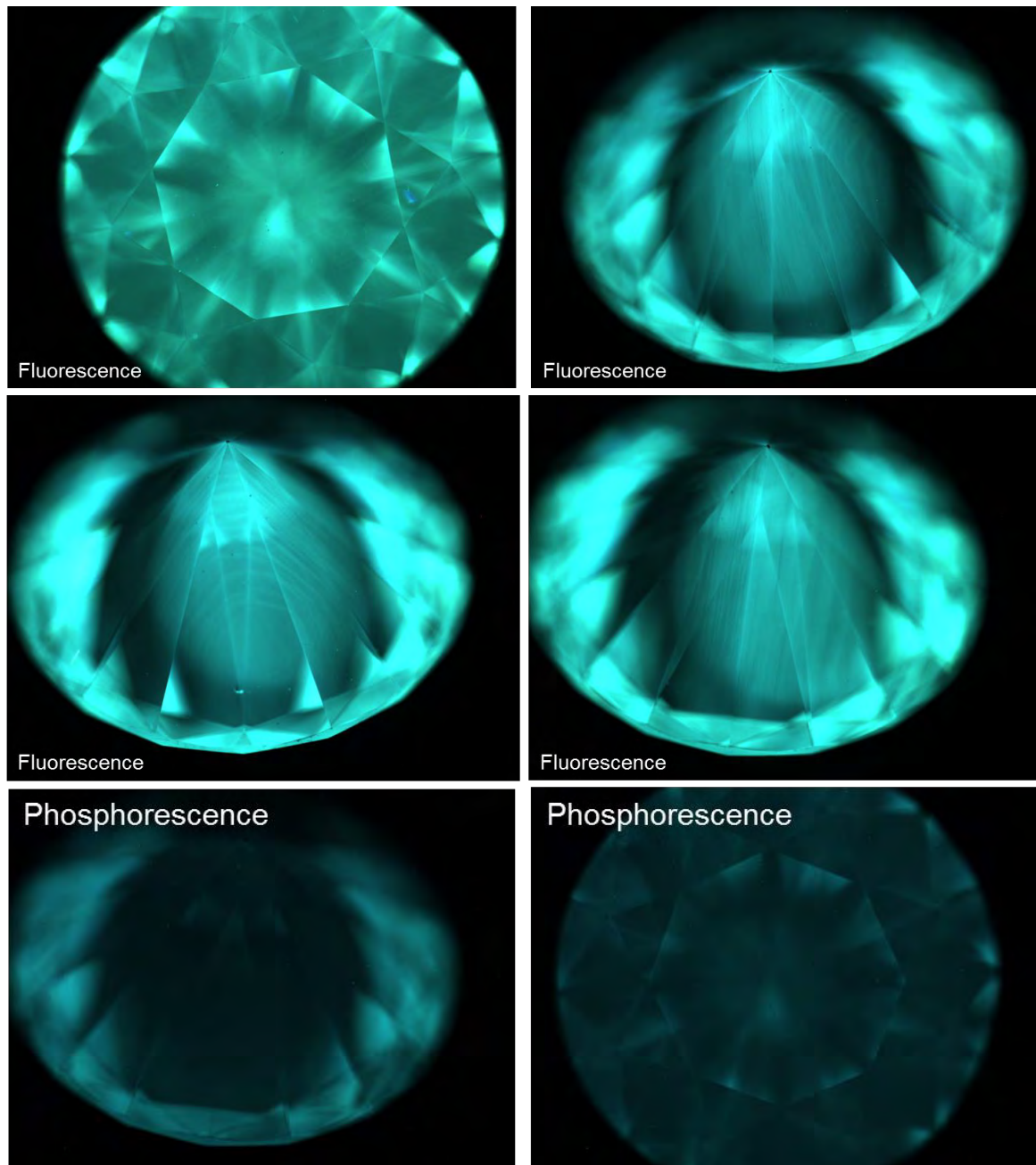
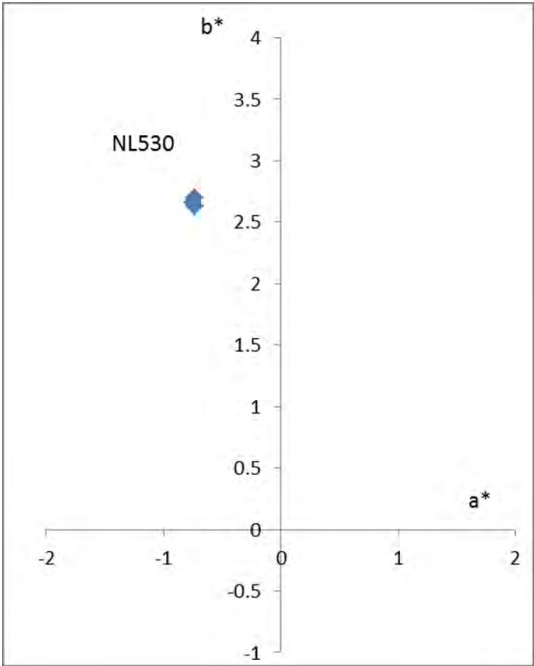


Figure 5: DiamondView fluorescence and phosphorescence images for NL530

3.4 Polished colour measurement

We used the Falcon colour measurement system to deduce L^* , a^* and b^* colour coordinates for NL530 and assign a colour grade. Three measurements were taken. The results, as shown in Figure 6, lie in the upper-left b^*a^* quadrant (i.e. negative a^* values), consistent with a yellow hue. As-grown (unannealed) nitrogen-doped CVD synthetics possess some degree of brown colour, which would lead to positive a^* values. After heat treatment to remove the brown colour, a yellow hue remains, which is due to neutral single substitutional nitrogen (N_s^0) impurities. This is a further indication that these gemstones have been heat-treated.

Using Falcon, a colour grade of F was deduced, with the subgrade 3 indicating that the colour was not far from the centre of this grade (Table 3). This colour grade is in agreement with the IGI’s colour grading result.



*Figure 6: b^*a^* colour coordinates for NL530 gemstones, as deduced using the Falcon polished colour system.*

	IGI grade	Falcon grade
NL530	F	F3

	L^*	a^*	b^*	c^*	Grade
NL530	96.28	-0.75	2.66	2.77	F3

*Table 3: $L^*a^*b^*c^*$ values for NL530 as deduced using Falcon.*

3.5 Infrared spectroscopy

Prior to measurement, the sample was exposed to ~5 minutes UV radiation using a DiamondView instrument in order to stabilise the charge states of the defects. Infrared spectra were then recorded for NL530 using a ThermoFisher Nicolet 380 FTIR spectrometer in diffuse reflectance mode. The spectrum was obtained using 0.5 cm^{-1} resolution, 512 scans and, after the measurement, a water spectrum was subtracted from the sample spectrum. Absorption coefficient values were deduced by multiplying the data points by a factor that was calculated by dividing 11.95 by the absorbance at 1995 cm^{-1} . The spectrum is shown in Figure 7. It contains very little absorption apart from the intrinsic absorption of diamond. The 1332 cm^{-1} peak indicates an upper limit for Ns^+ of 0.11 ppm but the concentration of single substitutional nitrogen was low enough for no peak to be observed at 1344 cm^{-1} and this is consistent with the good colour grade (F) of NL530.

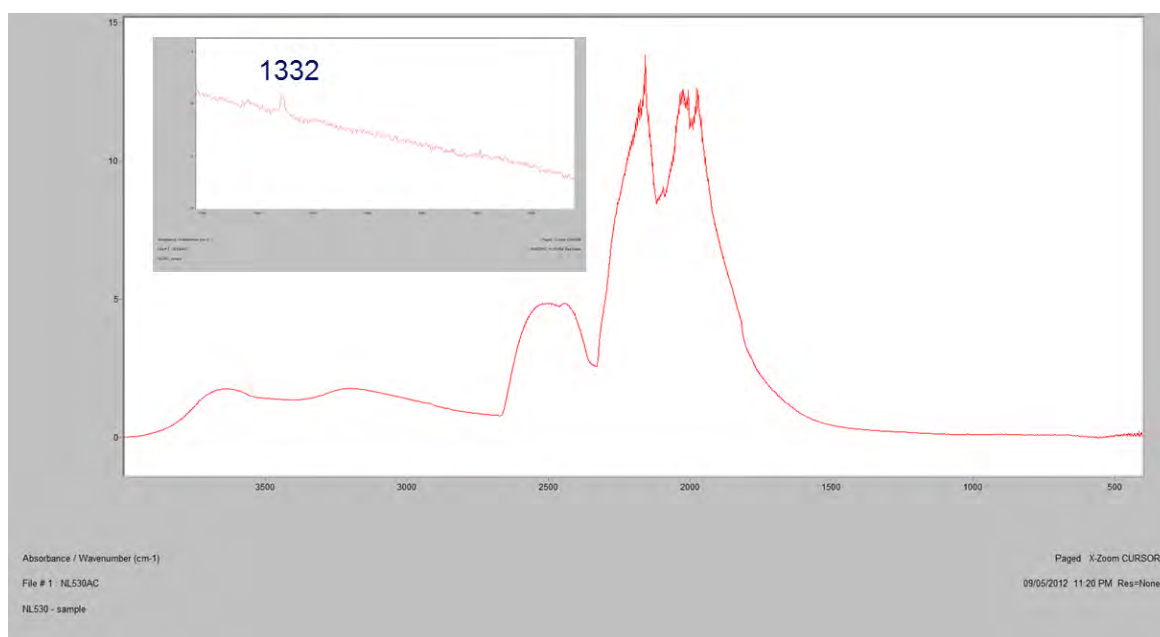


Figure 7: FTIR spectra of NL530. The inset shows a close-up of the one-phonon region of the spectrum.

No 3123 cm^{-1} feature (corresponding to the defect NVH^0) was detected in this sample. The absence of this feature is consistent with post-growth annealing, as although the 3123 cm^{-1} line is commonly observed in as-grown nitrogen-containing CVD synthetics, it is removed by annealing at 1800°C .

3.6 Photoluminescence spectroscopy

Photoluminescence data were recorded using the Horiba Labram HR system with the sample held at 77K using a continuous flow Oxford Instruments MicroStat. We compared the PL spectra of sample NL530 with a Gemesis CVD synthetic diamond (NL486-02) that we have previously investigated. The PL spectra are shown in Figure 8. The spectra were very similar to other Gemesis CVD synthetic

diamond samples that we have measured in the past, and the features showed a good correlation with those present in samples generated in De Beers research that have been annealed in the range of 1900-2000°C. In each Figure, the wavelengths of the PL features that suggest high-temperature treatment are marked out in red.

The following points are worthy of mention:

- The spectra for NL530 are similar to those for NL486-02; also note that the Raman normalised intensities measured 503 nm (H3, nitrogen – vacancy – nitrogen complex in the neutral charge state), 575 nm (nitrogen-vacancy defect in the neutral charge state), 637 nm (nitrogen-vacancy defect in the negative charge state) and 737 nm (silicon-vacancy defect in the negative charge state) zero phonon lines (shown in Table 4) for the two samples are very similar. This suggests a reproducible overall production process.
- In 325 nm excitation, a broad luminescence band is observed which peaks around 525 nm.
- 458 and 488 nm excitations show only moderate H3 luminescence, which is not surprising as the nitrogen concentration is low. The 575 and 637 nm lines are fairly weak. (Their Raman normalised intensities with 514 nm excitation were found to be only 0.04.) Although the nitrogen defects responsible for these lines are grown into plasma enhanced CVD synthetic diamond when nitrogen is present in the synthesis environment, their intensity tend to be reduced by heat treatment. $I_{503} / (I_{575} + I_{637}) = 1.3$ and this is close to the value (~ 1.5) recorded for NL486-02 and also consistent with values measured for samples in the De Beers research programme that were annealed between 1800 and 1900°C. Note that the observation of H3 for a sample with such a low nitrogen content is a strong indicator that the sample has been annealed as it would not be present in as-grown CVD synthetics containing such a low concentrations of nitrogen.
- Several weak lines between 520 and 570 nm confirm that the samples have been annealed. The spectra in this region are most similar to De Beers Technologies UK spectra of samples that were annealed at 1900 and 2000°C.
- The 737 nm line is not particularly strong in NL530; it is only a fraction of the Raman intensity but is slightly stronger than was measured for NL486-02.

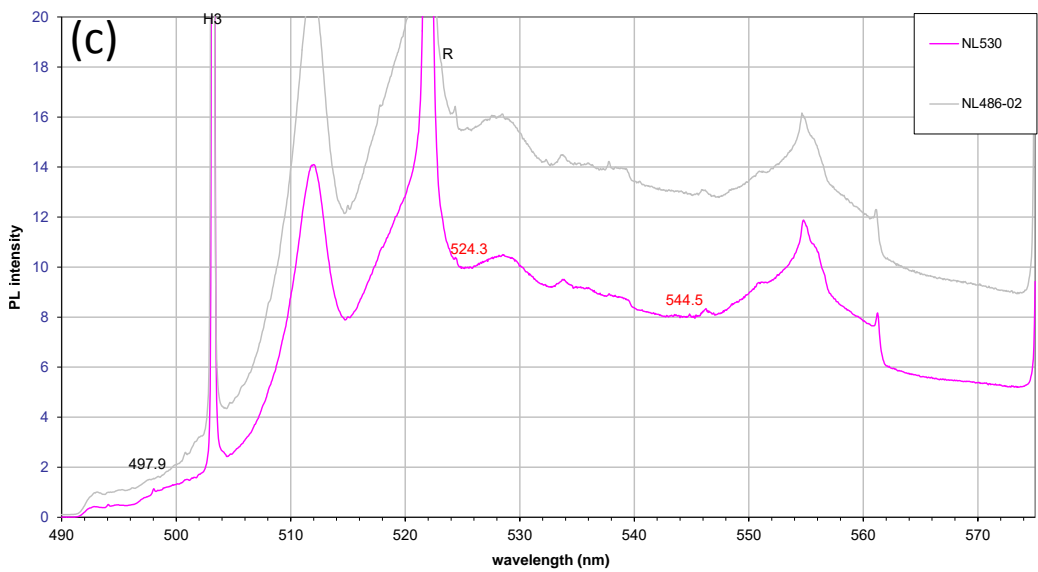
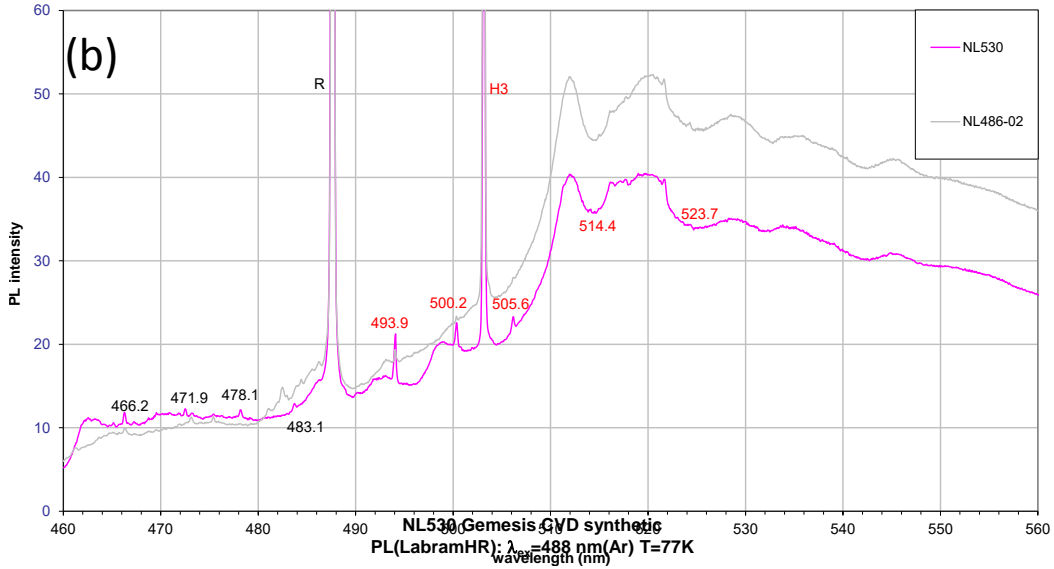
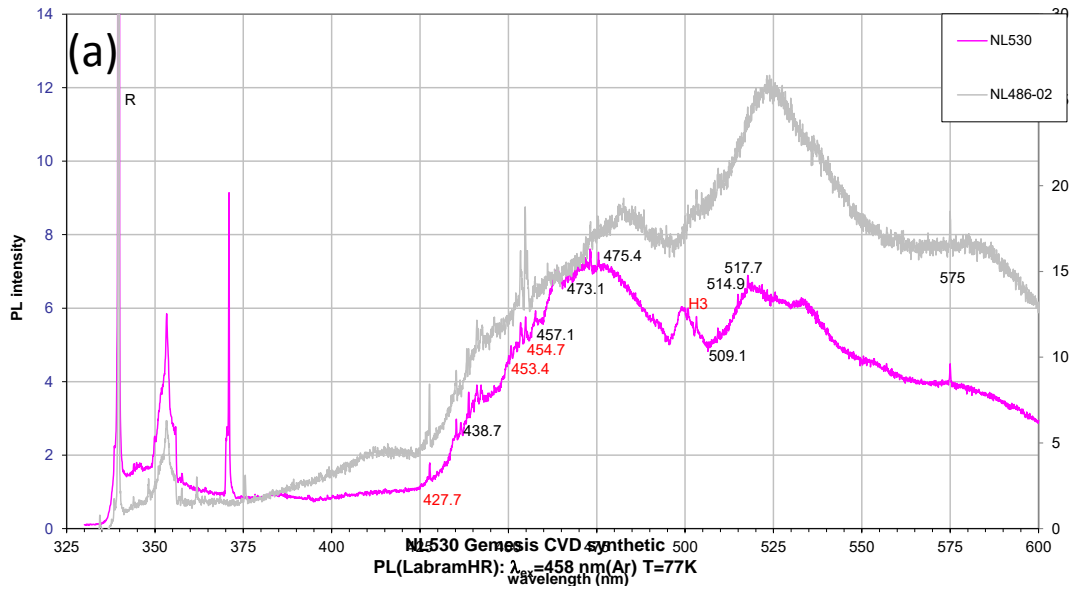
Sample	503/R	575/R	637/R	637/575	737/R
NL530	0.104	0.04	0.04	1	0.021
NL486-02	0.122	0.04	0.04	1	0.017

Table 4: Raman normalised photoluminescence intensity data for the 503, 575, 637 and 737 nm zero phonon lines for the Gemesis sample NL530

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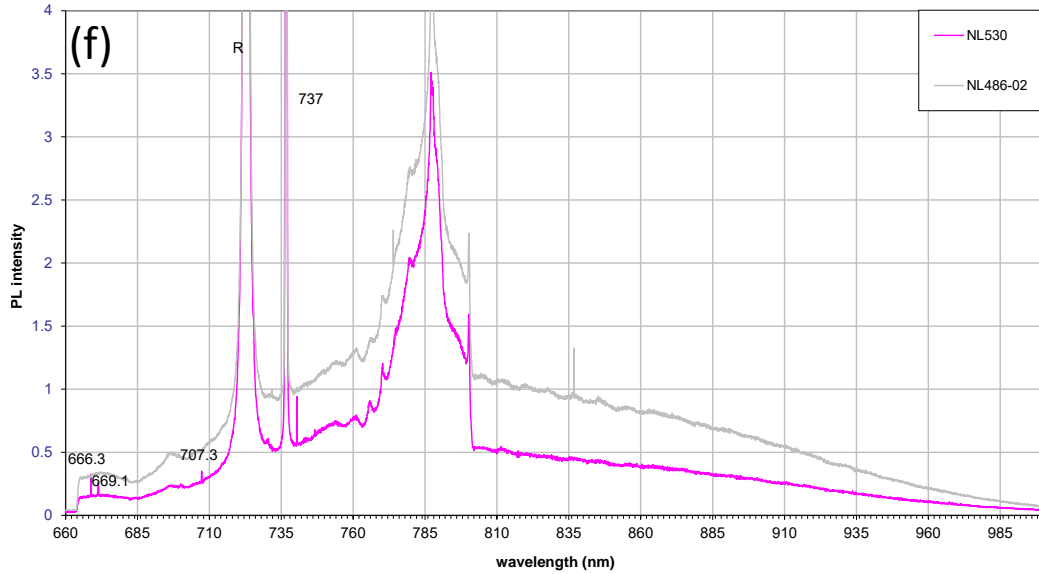
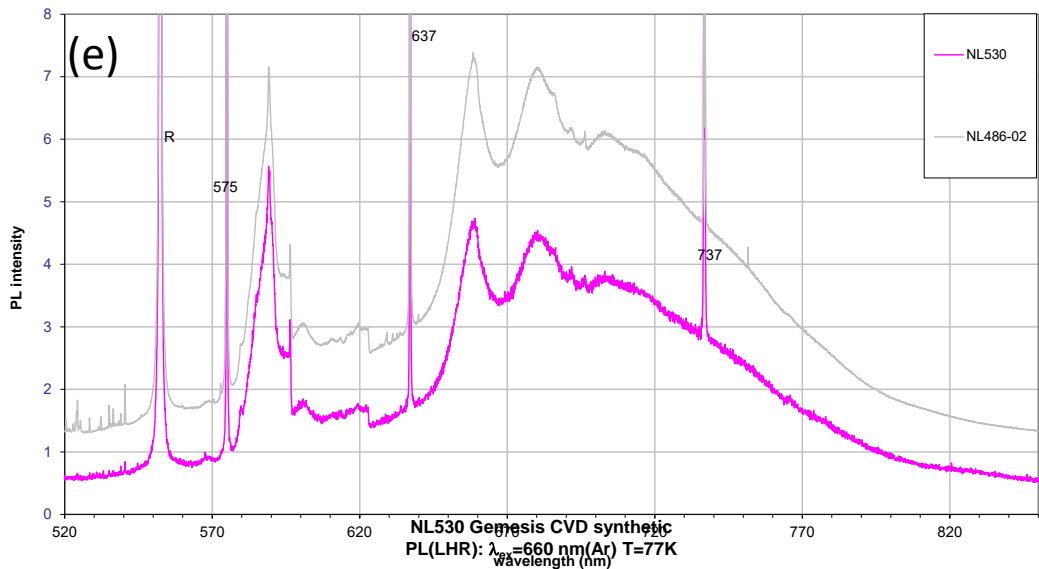
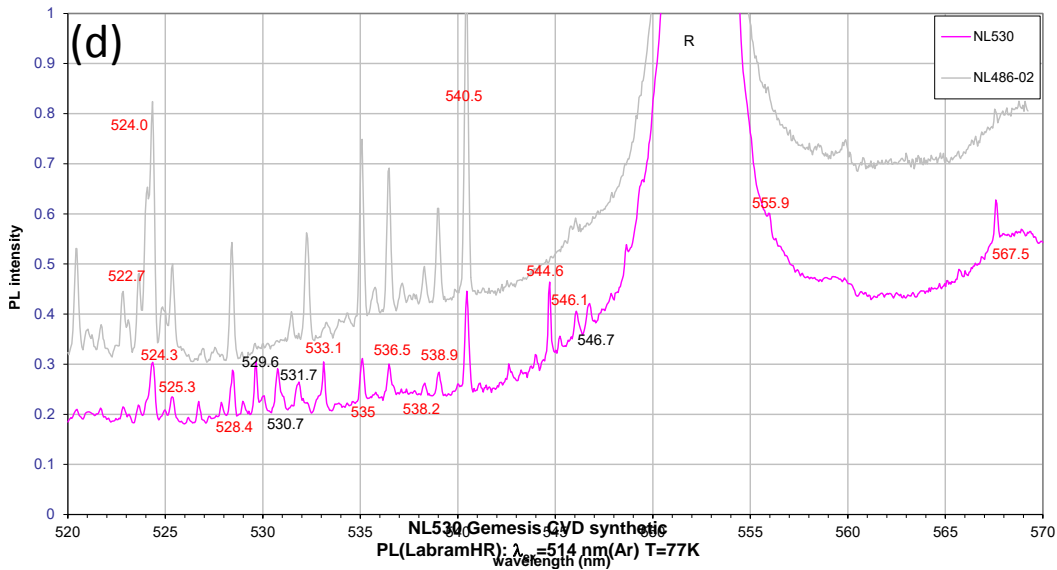
De Beers Technology UK

NL530 Gemesis CVD synthetic



CONFIDENTIAL

NL530 Genesys Technology UK
PL(LabramHR): λ_{ex} =514 nm(Ar) T=77K



CONFIDENTIAL

De Beers Technology UK
 NL530 Gemesis CVD synthetic
 PL(LHR): $\lambda_{\text{ex}}=785 \text{ nm}$ $T=77\text{K}$

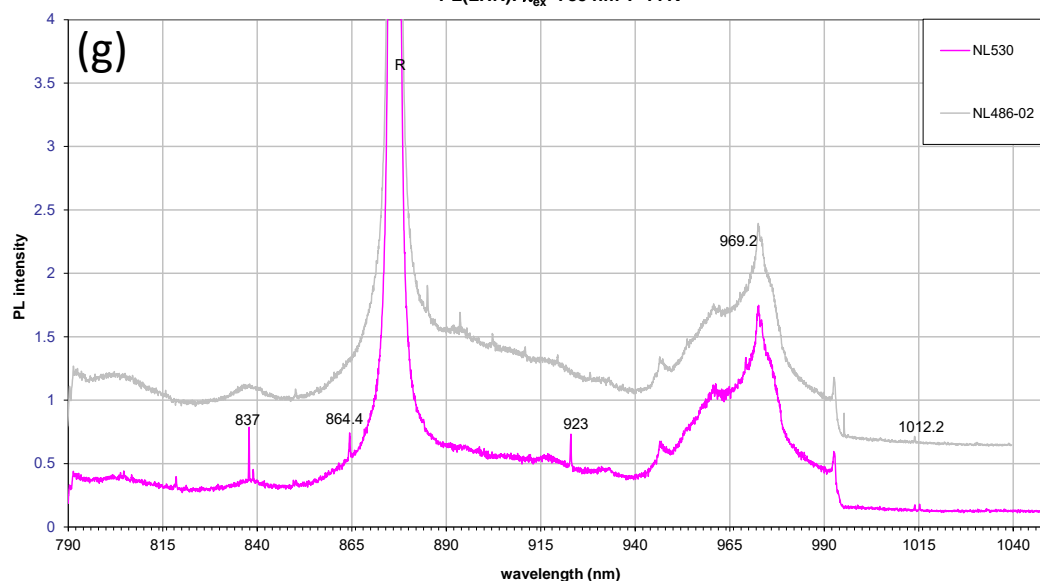


Figure 8: Photoluminescence spectra of sample (NL530) recorded at 77K with (a) 325 nm, (b) 458 nm, (c) 488 nm, (d) 514 nm (520-570 nm range), (e) 514 nm, and (f) 660 nm (g) 785 nm excitation. Data from another Gemesis sample (NL486-02) are also shown for qualitative comparison only.

3.7 Processing of sample prior to optical analysis

Gemstone NL530 was processed into a parallel-sided plate for optical analysis. Images of the final processed sample are shown in Figure 9. The culet was first removed by laser sawing. Then the exposed facet was polished (after the first polish, a UV-visible spectroscopy measurement was taken). Then, both the new facet and the table were polished to thin the sample. The girdle (containing the inscription) remained largely intact throughout the processing steps but the inscribed word “GEMESIS” appears to have been partially erased, possibly as a result of the way the stone was held during polishing. After processing, the plate produced from NL530 weighed 0.20 ct and had a thickness of 0.72 mm (z) and a diameter of 4.74 mm.

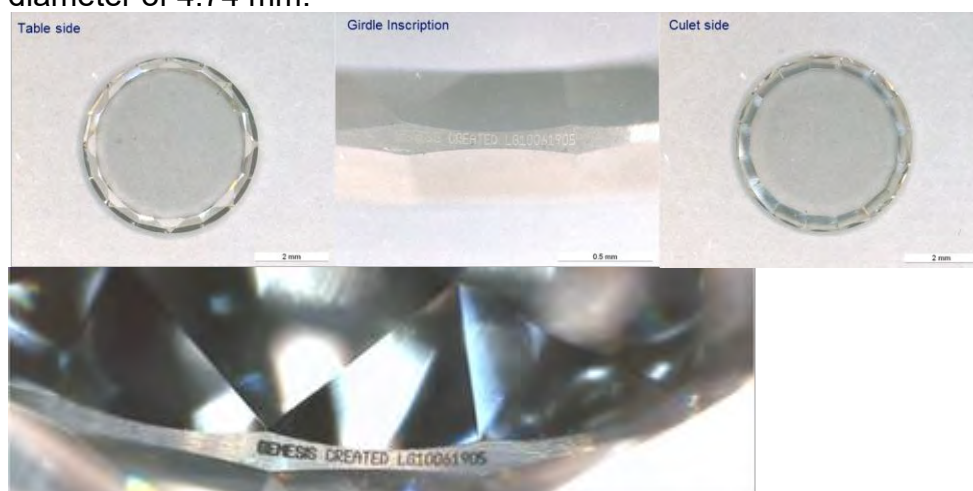


Figure 9: Images of NL530 (including girdle inscription) after it had been processed into a parallel sided plate. An image of the girdle inscription before processing is shown for comparison (see also figure 4).

3.8 UV-visible spectroscopy

A room temperature UV-visible spectrum of the parallel-sided plate produced from NL530 was recorded using a Perkin-Elmer Lambda 1050 spectrophotometer (see Figure 10). The sample was not exposed to UV radiation prior to measurement.

By minimising the strength of Ns^0 absorption by subtracting with a calibrated spectrum of type Ib diamond, a $[Ns^0]$ value of 0.17 ppm was deduced. This low value is consistent with the non-observation of the 1344 cm^{-1} peak in the FTIR spectrum. Comparison of the shape of the spectrum with that for Ns^0 indicates that there is a slight residual absorption that does not derive from Ns^0 . The shape of this residual suggests that the high-temperature treatment had not been entirely effective at removing absorption responsible for brown colour.

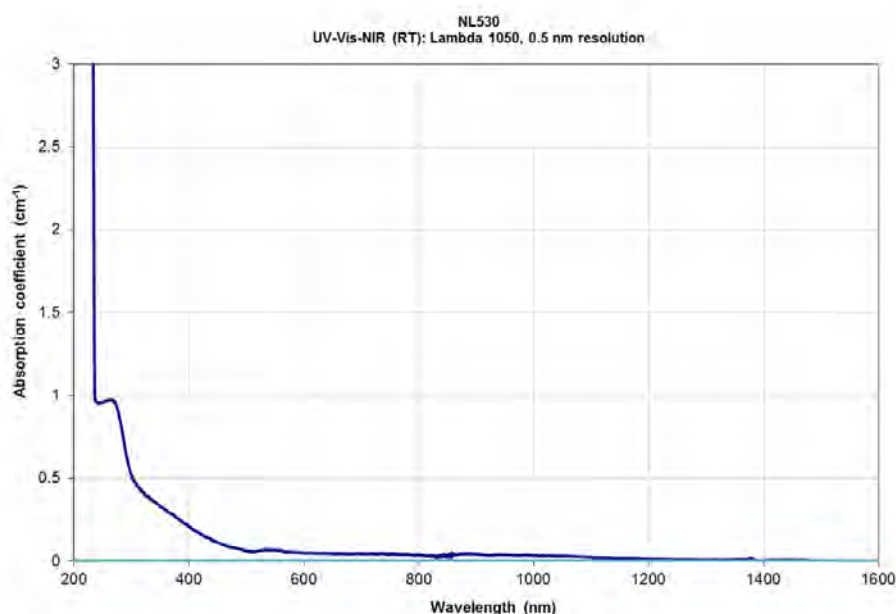


Figure 10: Room-temperature UV-visible absorption spectrum of NL530. The best fit to the 270 nm absorption feature indicated a $[Ns^0]$ value of 0.17 ppm.

3.9 Electron paramagnetic resonance (EPR)

EPR measurements were performed on the round brilliant NL530 (weight: 0.40 ct). They were performed at Warwick University and were received on 18 Sept 2012. Two measurements were taken in rapid-passage mode: one after the sample had been illuminated with above bandgap UV radiation and the other after heating of the sample in the dark to 500°C .

$[Ns^0]$ values were determined by comparison with a standard diamond reference with a known concentration of Ns^0 . These Ns^0 values measured for NL530 are shown in Table 5. We note a good agreement between the values deduced using EPR measurements on the round brilliant and that deduced using UV-visible absorption spectroscopy measurements on the polished plate produced from the round brilliant. A slight reduction in measured $[Ns^0]$ after heating of the sample in the dark is consistent with thermal excitation of electrons to the conduction band

and trapping at other defects present in the sample. De Beers research has indicated that this process is reversed by illumination with above band gap UV radiation.

	Weight (ct)	[Ns ⁰] (ppm)	[Ns ⁰] (cm ⁻³)
After UV illumination	0.40	0.160 ± 0.02	2.8±0.3 x10 ¹⁶
After heating	0.40	0.130 ± 0.02	2.3±0.3 x10 ¹⁶

Table 5: Ns⁰ concentration values deduced using EPR spectroscopy for the round brilliant NL530. Measurements were recorded after UV illumination and also after heating in the dark to 500°C.

3.10 Measurement of absorption coefficient at 1.06 µm

The parallel-side plate produced from NL530 was sent to Laser Zentrum Hannover for laser calorimetry measurements of absorbance at 1064 nm (1.064 µm). The measurement was carried out on 23 January 2015. The method used and the results are given in the LZH report number 14650. The method followed ISO 11551 and gave an absorbance result for the NL530 plate of 1727 ppm (1727 x 10⁻⁶). From this result and the thickness of the plate an absorption coefficient at 1064 nm of 0.024(3) cm⁻¹ was deduced.

3.11 Metripol analysis of optical quality

The parallel-sided plate was analysed using the Metripol microscope at Warwick University using an illumination wavelength (λ_{meas}) of 590 nm to give sin δ values pixel-by-pixel. A series of overlapping images was collected using a 4x objective, which provides a 1360 x 1024 pixel image covering 1.581 x 1.191 mm area with an approximate pixel size of 1.163 x 1.163 µm. The overlapping images were then stitched together to create one image of the entire area of the sample. The image stitching was completed using the free program “ImageJ” with the “stitching” plugin. This program allows the user to manually place individual image frames into position. The frame positions can then be computationally optimised and a stitched image / mosaic is generated along with a text file containing the optimized frame positions. De Beers Technologies UK have used a Matlab script, to stitch .ssf (data) files into an image using the optimized frame positions. A Matlab script has also been used to select and analyse appropriate square or rectangular regions of interest from the .ssf data image, (Figures 11 and 12). A complete description of the analysis and experimental technique is available in an internal report “Mapping samples using the Metripol and analysis using imageJ and Matlab”.

Two square regions of the sample image were selected as illustrated in Figure 11. These areas had dimensions of 1.3 mm x 1.3 mm and 2.5 mm x 2.5 mm. Histograms of Sin δ for selected areas can be created as illustrated in Figure 12.

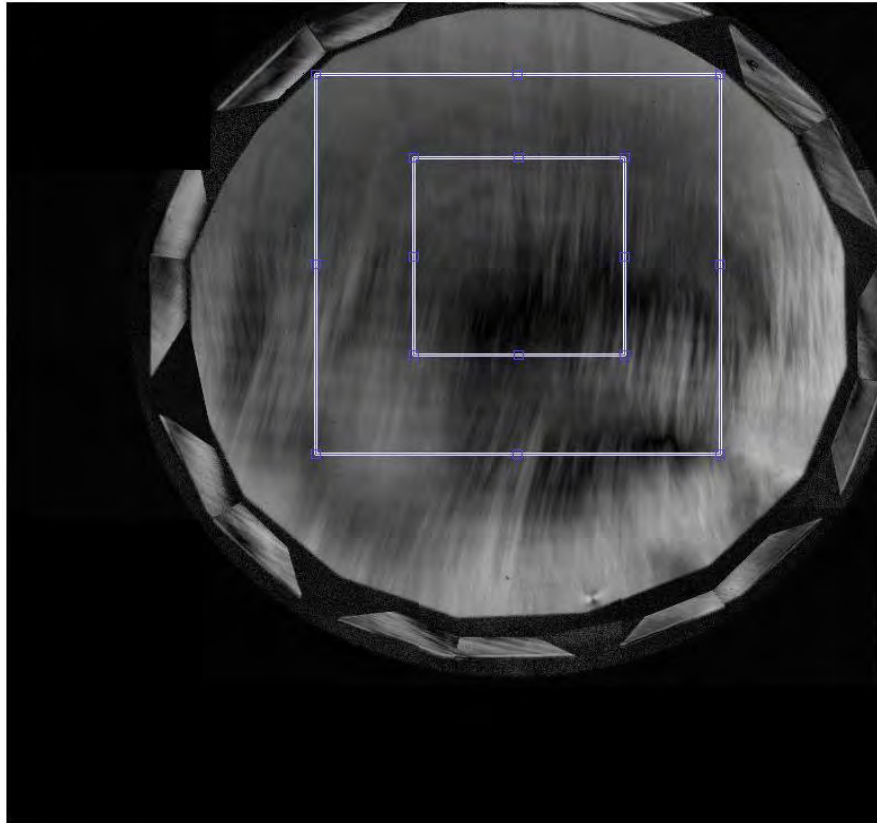


Figure 11: Square regions of the sample selected for analysis of the distribution of $\sin \delta$ values. The dimensions of these regions were 1.3 mm x 1.3 mm and 2.5 mm x 2.5 mm.

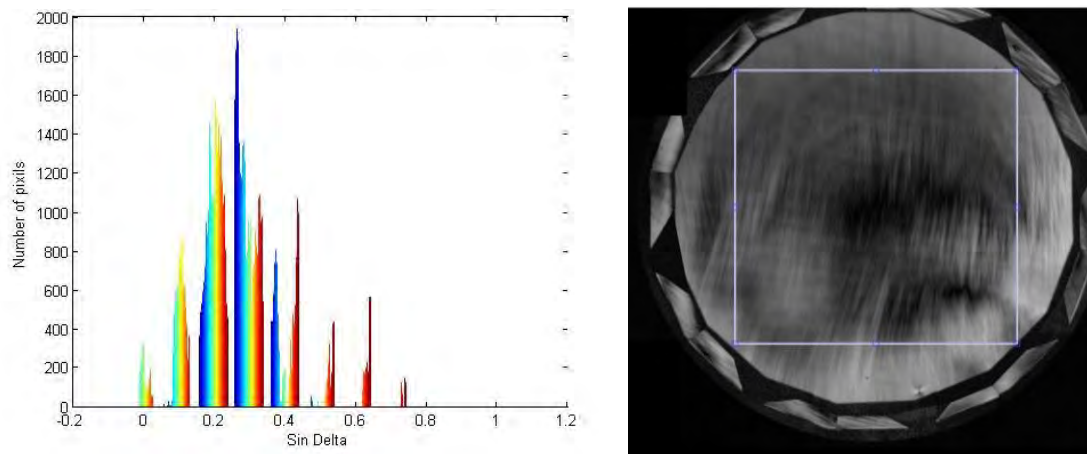


Figure 12: A histogram of values of $\sin \delta$ values for the 2.73 x 2.89 mm region, with a position shown by the white box in the image on the right.

For the two selected areas (shown in figure 11) the maximum $\sin \delta$ value was found ($\sin \delta_{\max}$), and hence δ_{\max} was calculated.

Using the equation $\Delta n_{\max} = \delta_{\max} \lambda_{\text{meas}} / 2\pi L$, Δn_{\max} was then deduced. The results are given in Table 6. For the selected 1.3 mm x 1.3 mm area the birefringence remains in first order (ie δ is less than $\pi/2$ radians) and $\sin \delta$ and $|\sin \delta|$ do not

exceed 0.352(20). Over the 2.5 mm x 2.5 mm area the birefringence remains in first order and $\sin \delta$ and $|\sin \delta|$ do not exceed 0.573(20). This table also includes $\sin \delta_{\max}$ and Δn_{\max} values after selection of the pixels with the 99% and 98% lowest values. Consideration of possible sources of measurement error indicates that the measured $\sin \delta_{\max}$ values are within 0.02 of the true values and the Δn_{\max} values are within 3×10^{-6} of the true values.

Dimension of selected area (mm)	$\sin \delta_{\max}$ (for 100% of the analysed area)	Δn_{\max} (for 100% of the analysed area)	$\sin \delta_{\max}$ (for 99% of the analysed area)	Δn_{\max} (for 99% of the analysed area)	$\sin \delta_{\max}$ (for 98% of the analysed area)	Δn_{\max} (for 98% of the analysed area)
1.3 x 1.3	0.352	4.69×10^{-5}	0.302	4.0×10^{-5}	0.291	3.85×10^{-5}
2.5 x 2.5	0.573	7.96×10^{-5}	0.427	5.75×10^{-5}	0.412	5.54×10^{-5}

Table 6: $\sin \delta_{\max}$ and Δn_{\max} values for selected regions over the NL530 plate. Values are given for 100% of the analysed area and for 99% and 98% of the analysed area.

4. CONCLUSION

This Gemesis round brilliant is very similar to many Gemesis CVD synthetics that De Beers Technologies UK have studied. The F colour grade means that it can be described as colourless, a descriptor generally reserved for stones with colour grades of D, E or F. It is clear from DiamondView images and PL spectroscopy that the sample is CVD synthetic in origin. The PL spectroscopy results the DiamondView images indicate that it has been annealed after growth, most likely in the range of 1900-2000°C. Using the instruments developed by De Beers Technologies UK and sold by IIDGR, gemmological laboratories should find such synthetic diamonds relatively easy to identify. The DiamondView images, in particular, should be straightforward to interpret.

We have noted similar nitrogen concentrations in different Gemesis diamond samples that we have investigated and this is unlikely to have resulted if the presence of nitrogen is accidental. It is therefore likely that the CVD synthesis employed involves intentional addition of nitrogen to the growth environment.

The plate produced from NL530 was found to have an absorption coefficient of $0.024(3) \text{ cm}^{-1}$ at a wavelength of $1.06 \text{ }\mu\text{m}$. The plate showed only first order birefringence. Over a selected 1.3 mm x 1.3 mm area $\sin \delta$ and $|\sin \delta|$ do not exceed 0.352(20), and over a selected 2.5 mm x 2.5 mm area $\sin \delta$ and $|\sin \delta|$ do not exceed 0.573(20). Over the 1.3 mm x 1.3 mm area the maximum Δn value was $4.69(30) \times 10^{-5}$ and for the 2.5 mm x 2.5 mm area the maximum Δn was $7.96(30) \times 10^{-5}$.

TECHNICAL REPORT

Title: Summary of Evidence that NL530 had been Heat Treated (Annealed) after Growth

Authors: Philip Martineau

Date: 5 October 2016

1. Introduction

NL530, a 0.40 ct CVD synthetic diamond round brilliant bought from Gemesis, was delivered to De Beers Technologies UK on 8 May 2012. It was characterized before being processed to produce a parallel-side plate for birefringence investigation. This short report presents some key findings of the initial characterization that provide evidence that the material had been annealed after growth.

2. Absorption spectroscopy

UV/visible absorption spectrum of NL530 recorded at room temperature only showed the 270 nm absorption feature associated with single substitutional nitrogen. The strength of the feature indicates that the approximate concentration of single substitutional nitrogen is 0.17 ppm.

The EPR spectrum indicated that the concentration of neutral single substitutional nitrogen was approximately 0.13 ppm after heating in the dark and 0.16 ppm after exposure to UV radiation.

The FTIR absorption spectrum shows very little extrinsic absorption but there is a small absorption peak at 1332 cm^{-1} consistent with a low concentration (upper concentration limit: 0.11 ppm) of positively charged single substitutional nitrogen.

3. Photoluminescence spectroscopy

Photoluminescence spectra from NL530 were recorded at liquid nitrogen temperature for various excitation wavelengths and some of the key photoluminescence lines observed are listed in table 1.

Excitation wavelength (nm)	PL features shown by NL530	Notes
325	427.7, 453.4, 454.7, H3	Lines not seen in as-grown material
458	Strong H3	$I(\text{H3})/I(\text{Raman}) = 0.104$
488	H3: 503 nm	Strong H3 consistent with heat treatment
514	544.6 nm, NV ⁰ : 575 nm, NV ⁻ : 637 nm	$I(\text{NV}^0)\text{ ZPL and }I(\text{NV}^-)\text{ ZPL} \approx 0.04 \times \text{Raman}$, Observation of 544.6 nm PL suggests annealing
660	737 nm	$I(737)/I(\text{Raman}) = 0.021$

Table 1 Key zero phonon lines (ZPL) present in photoluminescence spectra of NL530 recorded at liquid nitrogen temperature with various different laser excitation wavelengths

Table 2 lists Raman normalized intensities for some zero phonon lines present in photoluminescence spectra of NL530, along with other intensity ratios derived from the measurements.

$I(\text{NV}^0 \text{ ZPL})/I(\text{Raman})$	0.04
$I(\text{NV}^- \text{ ZPL})/I(\text{Raman})$	0.04
$I(\text{NV}^- \text{ ZPL})/I(\text{NV}^0 \text{ ZPL})$	1
$I(\text{H3 ZPL})/I(\text{Raman})$	0.104
$I(\text{H3 ZPL})/I(\text{NV}_{\text{total}})$ where $I(\text{NV}_{\text{total}}) = I(\text{NV}^0 \text{ ZPL}) + I(\text{NV}^- \text{ ZPL})$	1.3

Table 2 Raman normalized zero phonon line (ZPL) intensities for various defect centres

Previous investigations of the effect of heat treatment on the properties of CVD synthetic diamond samples produced by Element Six for research purposes have indicated that the ratio of the intensity of the H3 zero phonon line to the summed intensities of the NV^0 and NV^- zero phonon lines is changed by post-growth heat treatment (sometimes called annealing) in the way shown in figure 1. It can be seen from this figure that there is a marked increase of the ratio as a function of annealing temperature and measurements on a range of different samples have indicated that the ratio can be used as a reliable indicator of whether or not a sample has been post-growth heat treated and the approximate temperature of such heat treatment. The value of the ratio measured for NL530 is shown in figure 1 and indicates a heat treatment temperature of between 1900 and 2300°C.

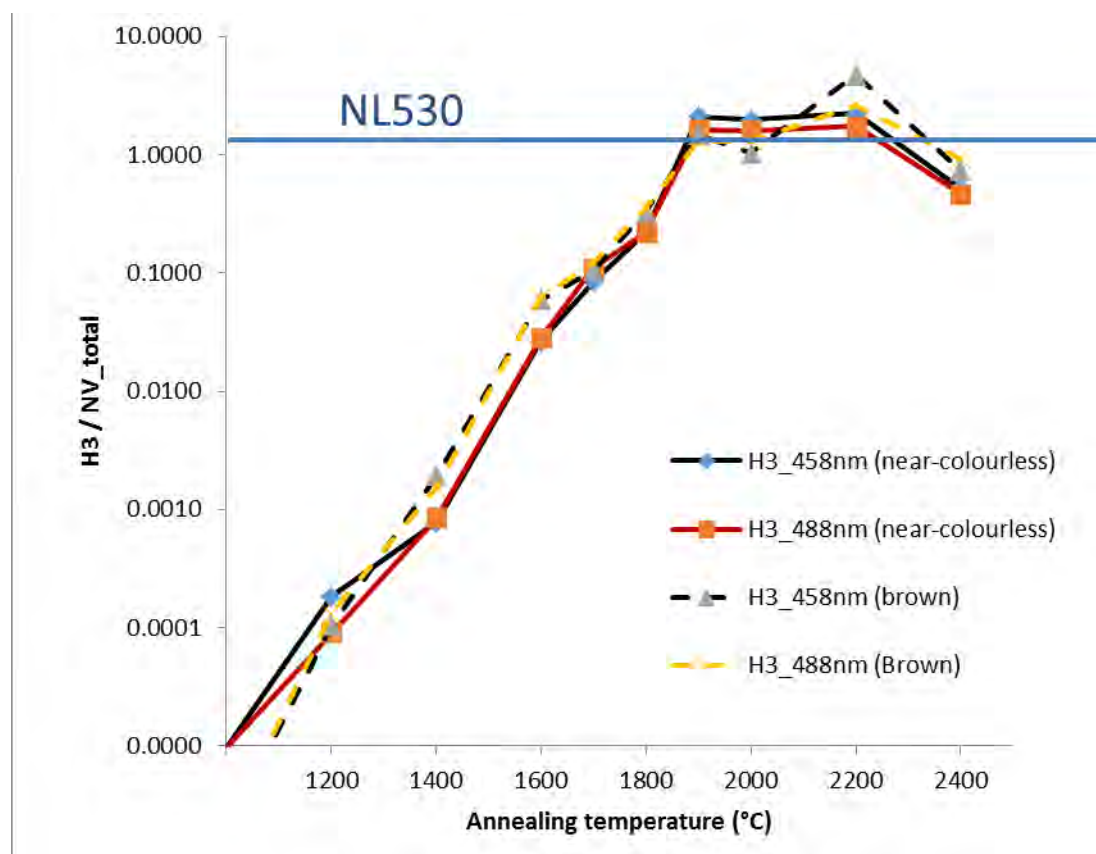


Figure 1 The ratio of H3/NV fluorescence intensities as a function of annealing temperature for brown and near-colourless CVD synthetic diamond. Results are shown for two different excitation wavelengths: 458 nm and 488 nm. The ratio for NL530 is shown by the horizontal line and suggests a heat treatment temperature in the approximate range 1900-2300°C.

4. DiamondView images

In the DiamondView instrument, samples are illuminated with above bandgap radiation and images are then captured of the resulting surface fluorescence and phosphorescence. The instrument is used by the diamond trade (eg grading laboratories) for identification of natural and synthetic diamond. It is also a useful sample characterization tool for research into the effects of heat treatment of synthetic diamond and in the course of such research carried out at De Beers Technologies we have captured images of CVD synthetic diamond samples of various kinds in their as-grown form and after heat treatments at different temperatures. **Figure 2** shows a series of DiamondView images of CVD synthetic diamond samples annealed at successively higher temperatures.

	<i>Microscopy Initial</i>	<i>DiamondView Initial</i>	<i>Microscopy T1</i>	<i>DiamondView T1</i>	<i>DiamondView (phosph.) T1</i>
1200°C / 4h DTC					none
1400°C / 4h DTC					none
1600°C / 4h IoM					none
1700°C / 4h IoM					
1800°C / 4h IoM					
1900°C / 4h IoM					
2000°C / 4h IoM					
2200°C / 4h IoM					
2400°C / 4h IoM					

Figure 2 Microscopy and DiamondView images of CVD synthetic diamond samples heat treated at different temperatures. (The 1200 and 1400°C heat treatments were carried out at atmospheric pressure but for the other heat treatments diamond stabilizing pressure was applied.)

It can be seen from figure 2 that as the temperature of the heat treatment applied to brown CVD synthetic diamond is increased

- i) the brown colour is removed,
- ii) the dominant fluorescence colour changes from orange to green and then to blue

iii) green phosphorescence appears and then, at higher temperatures, the dominant colour of the phosphorescence changes from green to blue.

DiamondView images of NL530 are shown below in figure 3 (fluorescence) and figure 4 (phosphorescence). The dominant colour of the fluorescence and together with the observation of blue phosphorescence is not consistent with what is observed for as-grown nitrogen-doped CVD diamond but is consistent with what would be expected for nitrogen-doped CVD synthetic diamond material that has been heat treated at high temperatures as illustrated in figure 1. Matching of the fluorescence/phosphorescence colours suggests a heat treatment temperature in the approximate range 2000-2200°C in agreement with the range indicated by the photoluminescence intensity ratio method outlined in section 3.

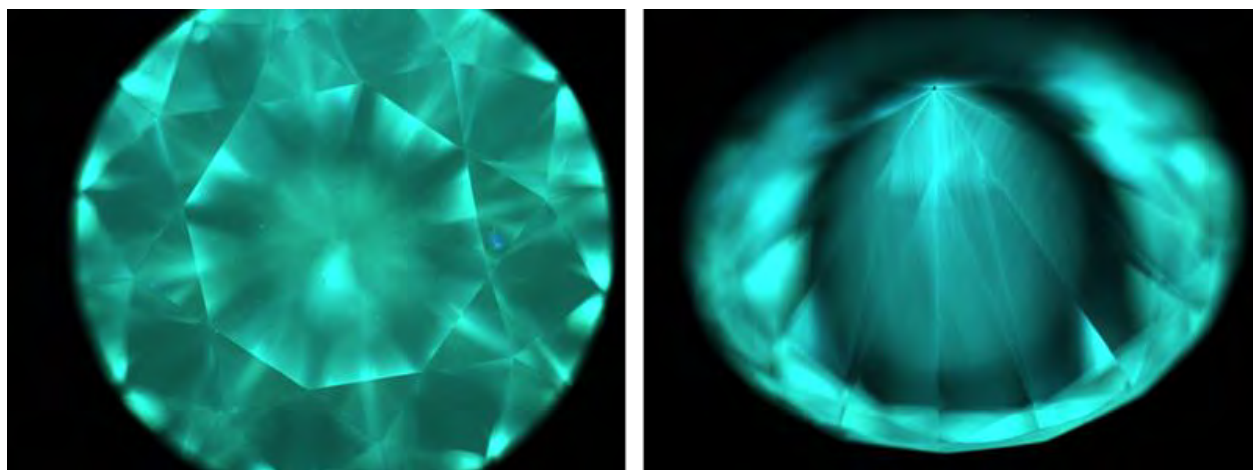


Figure 3 DiamondView fluorescence images of NL530

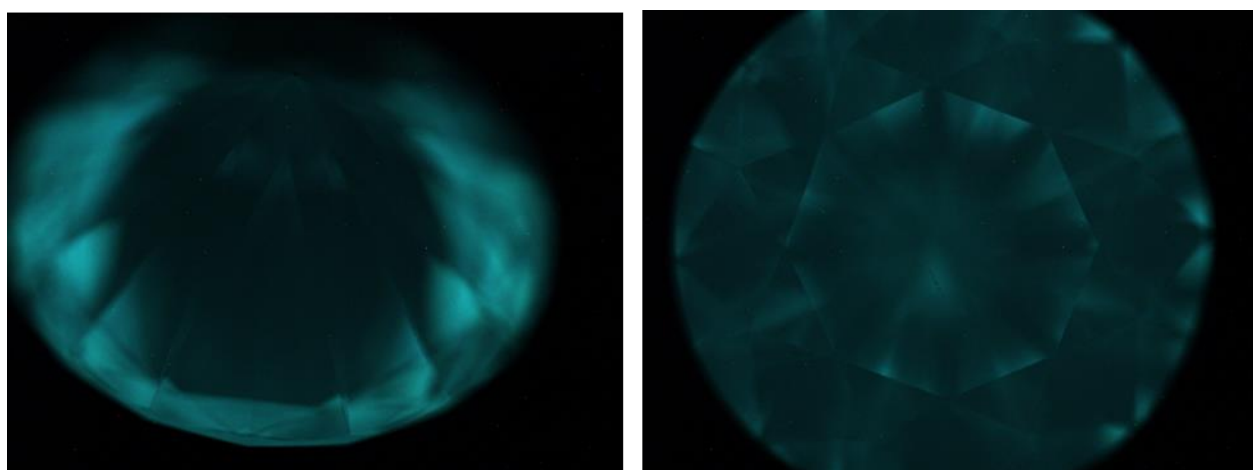


Figure 4 DiamondView phosphorescence images of NL530

5. Summary of characteristics of optical grade CVD synthetic diamond plates sold by Microwave Enterprises and changes observed after heat treatment

As detailed in this short report, characterization of the CVD synthetic diamond sample NL530 bought from Gemesis has strongly indicated that it has been heat treated after growth. We have, however, also had the opportunity to study ten CVD synthetic diamond plates (NL625-1 to -10) sold by Microwave Enterprises for optical applications and stated by them to have been produced by Ila Technologies and we found these samples to have characteristics consistent with their not having been heat treated after growth. This gave us the opportunity to investigate the effect of heat treatment on material grown by Ila Technologies. NL625-01 was heat treated at 2100°C for 30 minutes and NL625-06 was heat treated at 2400°C for 30 minutes. The effect on the fluorescence and phosphorescence characteristics is illustrated in figure 5.

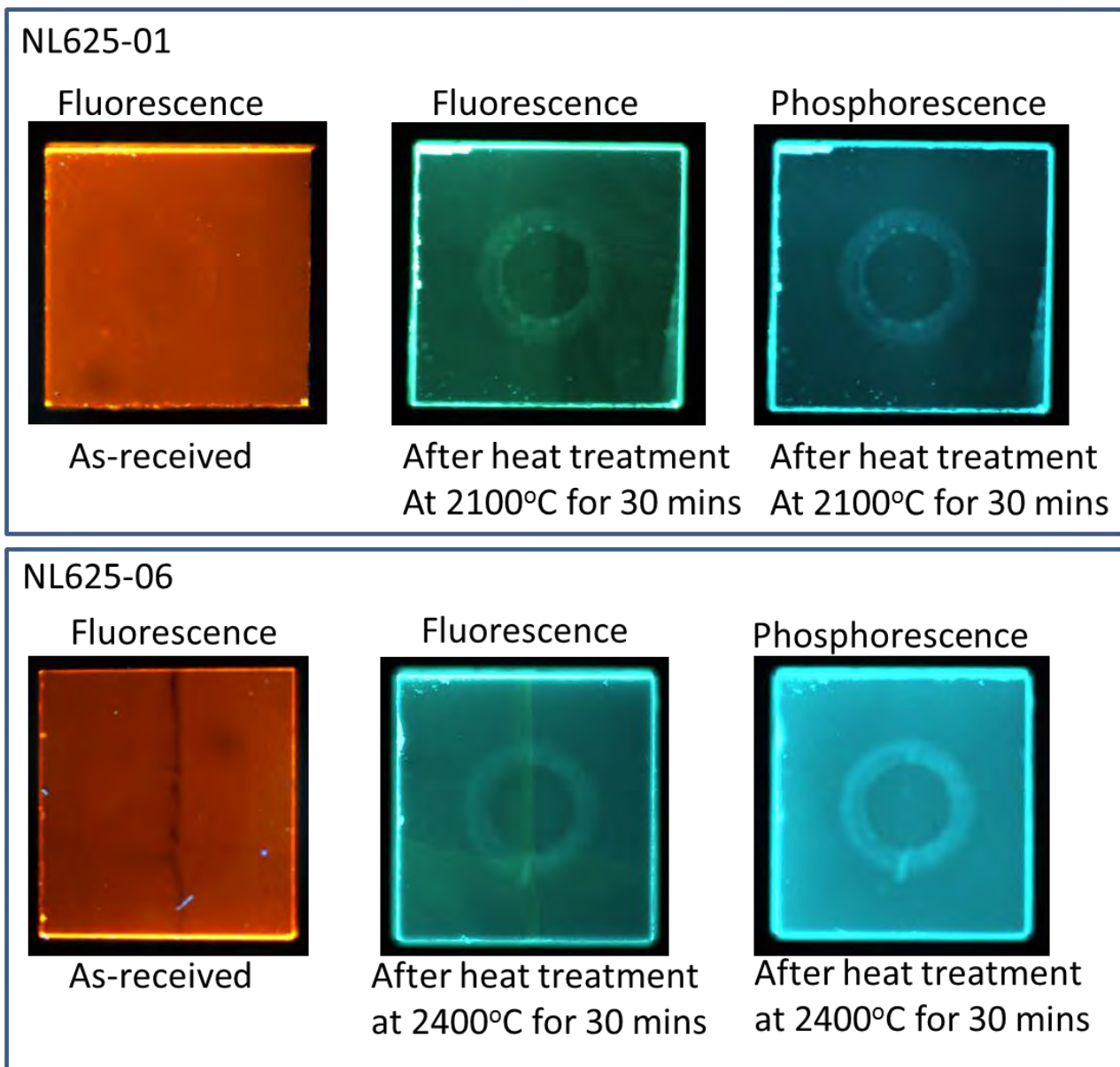


Figure 5 DiamondView images of NL625-01 and NL625-06 before and after heat treatment. Neither sample showed phosphorescence in their as-received form.

Photoluminescence spectra of all ten of the samples NL625-01 to -10 in their as-received form showed strong 575 and 637 nm lines from NV defects (with 514 nm excitation) and no H3 luminescence (with either 488 nm or 458 nm excitation). Although they were stated to be for optical applications they were brown and their UV/visible absorption spectra showed the gradual rise in absorption towards shorter wavelengths that is typical of as-grown nitrogen-doped CVD synthetic diamond samples. EPR spectroscopy indicated that they contained between 0.063 and 0.225 ppm of single substitutional nitrogen (NL625-01: 0.225 ppm and NL625-06: 0.100 ppm).

Detailed photoluminescence spectroscopy of the heat treated samples has not been carried out but comparison of figures 2 and 5 shows that the heat treated samples have DiamondView fluorescence and phosphorescence characteristics very similar to those of samples that we had previously grown and heat treated in the same temperature range as part of our experimental programme.

Comparison of figure 5 with figures 3 and 4 shows that the DiamondView fluorescence and phosphorescence characteristics of NL530 are very similar to those of the two NL625 samples that we heat treated at high temperatures.

6. Discussion

CVD diamond grown with nitrogen present in the growth environment tends to be brown and to contain nitrogen in forms such as single substitutional nitrogen, nitrogen-vacancy (NV) centres and nitrogen vacancy hydrogen (NVH) centres. Single substitutional nitrogen gives rise to the absorption feature at 270 nm and the P1 lines in the EPR spectrum. NV defects give rise to 575 and 637 nm luminescence features observed when a sample is excited at 514 nm, for example. NVH defects are responsible for the 3123 cm^{-1} line in the FTIR spectrum and a band at about 520 nm in the visible absorption spectrum.

When such CVD diamond is heat treated at high temperatures NVH defects are dissociated and as a result the 3123 cm^{-1} line and the 520 nm band are no longer observed. NV centres dissociate but low concentrations of these defects remain because of a dynamic equilibrium between their formation and loss. As a result the NV fluorescence intensity is reduced but weaker NV luminescence is still observable for nitrogen containing heat treated CVD diamond. Single substitutional nitrogen remains after heat treatment and in addition some nitrogen is found in an aggregated form known as the H3 centre. This is made up of two nitrogen atoms with a neighbouring missing carbon atom (vacancy). Our research has shown that as nitrogen containing CVD diamond is heat treated at successively higher temperatures, for given excitation conditions the ratio of the H3 luminescence intensity to the NV luminescence intensity increases in a way that enables the approximate temperature of heat treatment to be deduced from measurement of this ratio. For as-grown samples the H3 fluorescence is generally absent and NV fluorescence is strong.

The effect of heat treatment on defect centres responsible for fluorescence (NV centres and H3) also helps to explain the changes in the colours of the fluorescence observed in DiamondView images when samples are heat treated. Heat treatment reduces the concentration of NV centres that show orange/red fluorescence and increases the intensity of H3 centres that show green fluorescence. Additional blue fluorescence is introduced when samples are annealed at the highest temperatures.

For NL530 the results of absorption spectroscopy are consistent with heat treatment because of the absence of absorption from defects that are typically grown into CVD diamond but would be

removed by heat treatment. The results of photoluminescence spectroscopy and DiamondView imaging provide strong evidence that NL530 has been heat treated and indicate a heat treatment in the approximate range 1900-2300°C.

Samples received from Microwave Enterprises had characteristics consistent with their being in their as-grown form (not having been heat treated to high temperatures after growth). When two of these samples were heat treated at 2100°C and 2400°C, after the heat treatment their DiamondView characteristics were very similar to those of NL530. This indicates that when material grown by Ila Technologies is heat treated at high temperatures its DiamondView characteristics change dramatically from orange fluorescence and no phosphorescence (in the as-grown form) to blue/green fluorescence and blue phosphorescence (after heat treatment). NL530 showed blue/green fluorescence and blue phosphorescence and this is therefore additional evidence that it had been heat treated at high temperatures.

Philip Martineau

Senior Manager Physics at De Beers Technologies UK

September 2016

TECHNICAL NOTE

Title: Summary of Evidence that NL530 was Coloured Prior to Annealing

Author: Philip Martineau

Date: 5 October 2016

1. Introduction

NL530, a 0.40 ct synthetic diamond round brilliant bought from Gemesis Diamond Company in the USA, was delivered to De Beers Technologies UK on 8 May 2012. It was characterized before being processed to produce a parallel-side plate for birefringence investigation. Findings supporting the conclusion that NL530 is a CVD synthetic diamond are given in a report **“Analysis of Gemesis Gemstone NL530”**. Key findings that provide evidence that the material had been annealed after growth are summarized in a short report **“Summary of Evidence that NL530 had been Heat Treated (Annealed) after Growth”**. Here evidence that the sample was coloured prior to annealing is summarized.

2. Simple argument relating to the fact that the sample has been annealed

NL530 was given an F colour grade by IGI. This is within the range of colour grades (D, E, F) covering stones that are categorized as colourless. It is now well known that it is possible to change the colour of brown as-grown CVD synthetic diamond to more desirable colours by heat treatment (annealing) but that such annealing has no significant effect for CVD synthetic diamond material that is already colourless. The evidence that NL530 had been annealed is very strong and the author cannot think of any other credible reason why such annealing should have been carried out in this case other than to change the colour of the material. The fact that it was colourless after annealing therefore points to its having been coloured before annealing.

3. Evidence from Element Six research

In our research we have been growing and characterizing CVD synthetic diamond for many years and the only samples that we have generated in that research that have the properties and defect content of NL530 (eg photoluminescence and phosphorescence properties) are those that were brown in their as-grown form and that we have been annealed in a way that makes them more colourless. We have never produced colourless CVD synthetic diamond material with the observed properties by annealing a sample that was already colourless.

4. Evidence from annealing of brown material bought from Microwave Enterprises

We have studied ten samples (given label NL625-01 to NL625-10) bought from Microwave Enterprises. The quotation indicated that the samples were produced by Ila Technologies Pte Ltd Singapore and the box in which the samples arrived was labelled with the Ila Technologies logo. These samples showed no evidence of having been annealed, were brown and had absorption spectra very similar to those of brown CVD synthetic diamond samples that Element Six have grown with nitrogen to the growth process. We have annealed some of these NL625 samples to investigate

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the effect of annealing on this brown material. Optical absorption spectroscopy has been carried out before and after annealing for these samples and the optical absorption changed in the way that we expected from our previous experience and was consistent with a change of colour from brown to colourless. In addition, after annealing, the samples had the same photoluminescence and phosphorescence characteristics as the NL530. (See the report: **“Summary of Evidence that NL530 had been Heat Treated (Annealed) after Growth”**.) This shows that annealing brown CVD synthetic diamond grown by Ila Technologies leaves it with the properties observed for NL530. It is therefore supporting evidence that NL530 was coloured (brown) before it was annealed.

Philip Martineau

Senior Manager Physics at De Beers Technologies UK

5 October 2016

INVOICE

Gemesis Diamond Company
10530 PORTAL CROSSING #103 LAKEWOOD RANCH
FLORIDA-34211 :USA
Phone: (941) 840-6000
Fax: (941) 840-6019
Email : www.gemesis.com

**Invoice No #:** INV-REF/01-JAN-12/31

Date : 04/16/2012

Customer PO#**Payment Terms :**

Shipped Via :

Sold To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

Ship To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

All Prices in

#	Style#	Customer Style #	Qty	Carat Weight	Description	UOM (Each or Per Carat)	Unit Cost	Total Cost
1	D0000000000000000006173 DM-RND-VS2-H-4.80MM (4.7-4.95)-VGD-NONE-NONE		1	0.400	LG10061905	Per Pieces	\$734.96	\$734.96
Notes :								
Tracking#		1	0.400	Subtotal				\$734.96
				TOTAL DUE				\$0.00

THANK YOU FOR YOUR ORDER.

Disclosure: All diamonds from Gemesis are lab-created, guaranteeing a socially and ecologically responsible point of origin.

Luxury has evolved

Packing Slip# PL-5382 Order # 100005382 Order Date 04/16/2012 12:00:00AM									
SOLD TO:					SHIP TO:				
Chuiguan Ng Blk 130, Simei Street 1 #09-250 Singapore, 520130 SG Contact# Fax # :					Blk 130, Simei Street 1 #09-250 Singapore, 520130 SG Contact# Fax # :				
PAYMENT METHOD:					SHIPPING METHOD:				
Credit card					Shipping Fedex				
Qty	Category	Title	SKU/Stock No/Slash No	Size	QLTY	CLR	Certificate No	Metal kt/Color	Amount
1		0.40 ct ROUND DIAMOND	D000000000000000000000006173		VS2	F	LG10061905		734.96

Thank you for choosing Gemesis

All amount include taxes where applicable

If you have any questions about your order please contact us at customerservices@gemesis.com or speak to one of our Diamond & Jewelry Consultants at 866-799-8885(24x7).

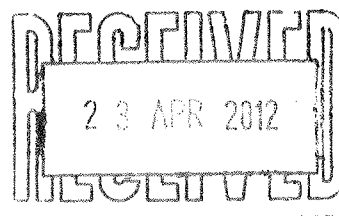
HS INTELLECTUAL PROPERTY SERVICES

101 Upper Cross Street
#04-38, People's Park Centre
Singapore 058357
Telephone : (65) 6533 1248
Facsimile : (65) 6533 9210

Our reference : HS/IP/038/12

20 April 2012

Mr Jason Chan
M/s Amica Law LLC
30 Raffles Place, #18-03/04
Chevron House
Singapore 048622.



Dear Sirs,

GEMSEIS DIAMOND COMPANY
TRAP-PURCHASE

We refer to your recent instructions to our firm to conduct a trap-purchase of a diamond from the aforementioned United States of America incorporated business entity.

On 16 April 2012, an online trap-purchase of a round diamond was conducted from Gemesis Diamond Company via its website @ www.gemesis.com. The diamond ordered/purchased has the underlisted details :

Shape	: Round
Weight	: 0.40 ct
Colour	: F
Cut	: Ideal
Clarity	: VS2
Price	: USD 734.96

The same day, an email confirmation of the order was received from Gemesis Diamond Company giving details of the order no. (#100005382), billing information, payment method, shipping information and shipping method (via FedEx). The total cost including shipping and handling charges is stated as USD 834.96. A copy of this email confirmation is attached hereto as reference.

On 20 April 2012, a self-collection of the order was made at one of the FedEx centres located at 6 Changi South Street 2. An invoice from Gemesis Diamond Company (invoice no # : INV-REF/01-JAN-12/31) attached together with the package is attached hereto as referemnce.

contd /Page 2

HS INTELLECTUAL PROPERTY SERVICES

HS/IP/038/12 Page 2

The FedEx package containing the order (unopened) is forwarded together with this report for your necessary attention.

Should you have any other queries concerning this matter, please contact us.

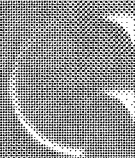
Our invoice billed for the services rendered in the conduct of this matter is also enclosed hereto for your kind attention.

Yours sincerely,



Ng Chui Guan
for HSIPS

enc : Order confirmation email from Gemesis Diamond Company
Invoice from Gemesis Diamond Company
HS invoice HS/028/12



Hello, Chuiguan Ng

Thank you for your order from Gemesis. Once your package ships we will send an email with a link to track your order. If you have any questions about your order please contact us at customerservice@gemesis.com or call us at 888-799-8885 24/7.

Your order confirmation is below. Thank you again for your business.

Your Order #100005382 (placed on April 16, 2012 8:05:10 AM EDT)

Billing information:

Chulguang Ng
Blk 130, Simai Street 1
#09-250
Singapore, 520130
Singapore
T: 6598194487

Payment Method:

Credit Card
Credit Card Type:
Visa
Credit Card Number:
xxxx-7438

Shipping Information:

Chuiguan Ng
Blk 130, Simai Street 1
#09-250
Singapore, 520130
Singapore.
T: 6598184467

Shipping Method:

International: 800-451-7243

Item	Sku	Qty	Subtotal
0.48 ct ROUND DIAMOND	D00000000000000000006173	1	\$734.96
Subtotal			\$734.96
Shipping & Handling			\$100.00
Grand Total			\$834.96

Thank you for your business!

INVOICE

Gemesis Diamond Company
10530 PORTAL CROSSING #103 LAKEWOOD RANCH
FLORIDA-34211 :USA
Phone: (941) 840-6000
Fax: (941) 840-6019
Email : www.gemesis.com

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Contact#

All Prices in

#	Style#	Customer Style #	Qty	Carat Weight	Description	UOM (Each or Per Carat)	Unit Cost	Total Cost
1	D000000000000000006173 DM-RND-VS2-H-4.80MM (4.7-4.95)-VGD-NONE-NONE		1	0.400	LG10061905	Per Pieces	\$734.96	\$734.96
Notes :								
Tracking#		1	0.400	Subtotal				\$734.96
				TOTAL DUE				\$0.00

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Disclosure: All diamonds from Gemesis are lab-created, guaranteeing a socially and ecologically responsible point of origin.



INTERNATIONAL GEMOLOGICAL INSTITUTE

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LABORATORY GROWN DIAMOND REPORT

DATE: 6/27/2011

REPORT NUMBER: LG10061905

DESCRIPTION:

LABORATORY GROWN DIAMOND

SHAPE AND CUTTING STYLE:

ROUND BRILLIANT CUT

MEASUREMENTS:

4.78 - 4.93 x 2.93 MM.

GRADING RESULT:

Carat Weight: 0.40 CT(S)

Color Grade: F

Clarity Grade: VS2

Cut Grade: IDEAL

PROPORTIONS:

Depth: 60.9%

Table: 59%

Crown Height % - Ang ° 14.0% - 33.0°

Pavilion Depth % - Ang ° 44.0% - 41.3°

Girdle: THIN TO MEDIUM

Culet: NONE

FINISH:

Polish: VERY GOOD

Symmetry: VERY GOOD

FLUORESCENCE:

NONE

COMMENTS: GIRDLE LASERSCRIBED "GEMESIS CREATED LG10061905".
THE LABORATORY GROWN DIAMOND DESCRIBED ABOVE IS CLASSIFIED
AS A TYPE IIA.

Red symbols denote internal characteristics (inclusions). Green or black symbols denote external characteristics (blemishes). Diagram in an approximate representation of this stone, and symbols shown indicate type, position, and approximate size of clarity characteristics. All clarity characteristics may not be shown. Details of finish are not shown.

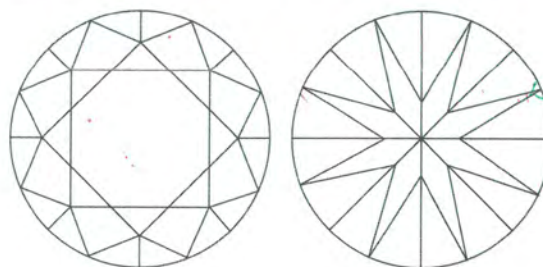


PHOTO ENLARGED

**COLOR
GRADING
SCALE**

CL	NC	FT	VLT	LT
COLORLESS D - F	NEAR COLORLESS G - J	FAINT K - M	VERY LIGHT N - R	LIGHT S - Z
FL	IF	VVS	VS	SI
FLAWLESS	VERY VERY SLIGHTLY INCLUDED	VERY SLIGHTLY INCLUDED	SLIGHTLY INCLUDED	INCLUDED
INTERNALLY FLAWLESS				

**CLARITY (10X)
GRADING
SCALE**

The laboratory grown diamond described in this Report ("Report") has been graded, tested, analyzed, examined and/or inscribed by International Gemological Institute (I.G.I.). A laboratory grown diamond is one that has the same chemical, physical and optical properties as mined diamond, with the exception of being grown by man. I.G.I. employs and utilizes those techniques and equipment currently available to I.G.I., including, without limitation, 10X magnification, corrected triplet loupe and binocular microscope, master color comparison system, non-contact-optical measuring device, and such other instruments and/or processes as deemed appropriate by I.G.I. This Report includes advanced security features. A duly accredited gemologist or jeweler can advise you with respect to the importance of and interrelationship between cut, color, clarity and carat weight.

THIS REPORT IS NEITHER A GUARANTEE, VALUATION NOR APPRAISAL OF THE LABORATORY GROWN DIAMOND DESCRIBED HEREIN.

From: Origin ID: BOWA (941) 840-6008
CHRISTEEN JORNO
GDC
10530 PORTAL CROSSING
SUITE 103
LAKEWOOD RANCH, FL 34211
UNITED STATES



Ship Date: 16APR12
ActWgt: 1.0 LB
CAD: 4490707/ESDS0400

REF:
DESC-1: Finished Goods 7102390010
DESC-2:
DESC-3:
DESC-4:
EEI: NO EEI 30.37(a)
COUNTRY MFG: IN
CARRIAGE VALUE: .00 USD
CUSTOMS VALUE: 734.96 USD
T/C: O 399105803 D/T: R
SIGN: CHRISTEEN JORNO
EIN/VAT:
PKG TYPE: BOX

SHIP TO: 6598194467

BILL THIRD PARTY

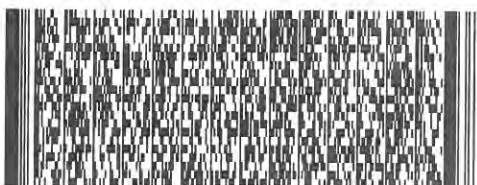
Chuiguan Ng
Chuiguan Ng
Blk 130, Simei Street 1
#09-250

Singapore, 520130
SG

TRK# 7916 1862 1100
0430

INTL PRIORITY

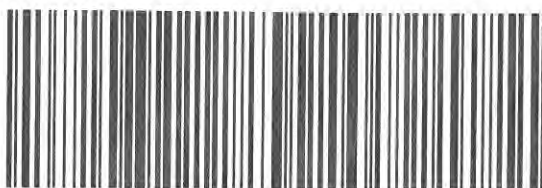
A1



X2 SINA

520130

-SG
SIN



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The Warsaw Convention may apply and will govern and in most cases limit the liability of Federal Express for loss or delay of or damage to your shipment. Subject to the conditions of the contract.

CONSIGNEE COPY - PLEASE PLACE IN POUCH

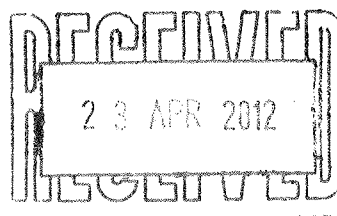
HS INTELLECTUAL PROPERTY SERVICES

101 Upper Cross Street
#04-38, People's Park Centre
Singapore 058357
Telephone : (65) 6533 1248
Facsimile : (65) 6533 9210

Our reference : HS/IP/038/12

20 April 2012

Mr Jason Chan
M/s Amica Law LLC
30 Raffles Place, #18-03/04
Chevron House
Singapore 048622.



Dear Sirs,

GEMSEIS DIAMOND COMPANY
TRAP-PURCHASE

We refer to your recent instructions to our firm to conduct a trap-purchase of a diamond from the aforementioned United States of America incorporated business entity.

On 16 April 2012, an online trap-purchase of a round diamond was conducted from Gemesis Diamond Company via its website @ www.gemesis.com. The diamond ordered/purchased has the underlisted details :

Shape	: Round
Weight	: 0.40 ct
Colour	: F
Cut	: Ideal
Clarity	: VS2
Price	: USD 734.96

The same day, an email confirmation of the order was received from Gemesis Diamond Company giving details of the order no. (#100005382), billing information, payment method, shipping information and shipping method (via FedEx). The total cost including shipping and handling charges is stated as USD 834.96. A copy of this email confirmation is attached hereto as reference.

On 20 April 2012, a self-collection of the order was made at one of the FedEx centres located at 6 Changi South Street 2. An invoice from Gemesis Diamond Company (invoice no # : INV-REF/01-JAN-12/31) attached together with the package is attached hereto as referemnce.

contd /Page 2

HS INTELLECTUAL PROPERTY SERVICES

HS/IP/038/12 Page 2

The FedEx package containing the order (unopened) is forwarded together with this report for your necessary attention.

Should you have any other queries concerning this matter, please contact us.

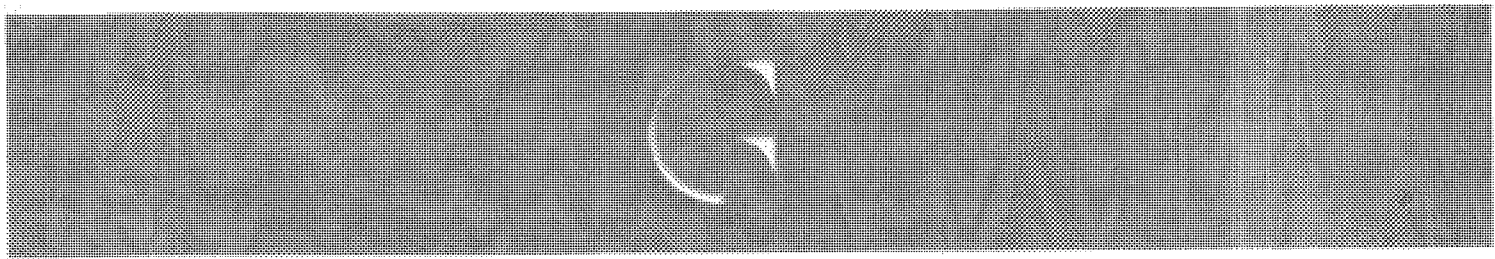
Our invoice billed for the services rendered in the conduct of this matter is also enclosed hereto for your kind attention.

Yours sincerely,



Ng Chui Guan
for HSIPS

enc : Order confirmation email from Gemesis Diamond Company
Invoice from Gemesis Diamond Company
HS invoice HS/028/12



Hello, Chuiguan Ng

Thank you for your order from Gemesis. Once your package ships we will send an email with a link to track your order. If you have any questions about your order please contact us at customerservice@gemesis.com or call us at 888-799-8885 24/7.

Your order confirmation is below. Thank you again for your business.

Your Order #100005382 (placed on April 16, 2012 8:05:10 AM EDT)

Billing Information:

Chuiquan Ng
Blk 130, Simai Street 1
#09-250
Singapore, 520130
Singapore
T: 6598194487

Payment Method:

Credit Card
Credit Card Type:
Visa
Credit Card Number:
xxxx-7438

Shipping Information:

Chui Guan Ng
Blk 130, Simai Street 1
#09-250
Singapore, 520130
Singapore
T: 6598184487

Shipping Method:

International - FedEx

Item	Sku	Qty	Subtotal
0.40 ct ROUND DIAMOND:	D0000000000000000008173	1	\$734.96
		Subtotal	\$734.96
		Shipping & Handling	\$100.00
		Grand Total	\$834.96

Thank you again, Gemosis

INVOICE

Gemesis Diamond Company
10530 PORTAL CROSSING #103 LAKEWOOD RANCH
FLORIDA-34211 :USA
Phone: (941) 840-6000
Fax: (941) 840-6019
Email : www.gemesis.com

**Invoice No #:** INV-REF/01-JAN-12/31

Date : 04/16/2012

Customer PO#**Payment Terms :**

Shipped Via :

Sold To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

Ship To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

All Prices in

#	Style#	Customer Style #	Qty	Carat Weight	Description	UOM (Each or Per Carat)	Unit Cost	Total Cost
1	D000000000000000006173 DM-RND-VS2-H-4.80MM (4.7-4.95)-VGD-NONE-NONE		1	0.400	LG10061905	Per Pieces	\$734.96	\$734.96
Notes :								
Tracking#		1	0.400	Subtotal				\$734.96
				TOTAL DUE				\$0.00

THANK YOU FOR YOUR ORDER.

Disclosure: All diamonds from Gemesis are lab-created, guaranteeing a socially and ecologically responsible point of origin.

Page 1 of 1

arising from the disclosure or publication of this report or any part thereof.



TAX INVOICE

CHUIGUAN NG
CHUIGUAN NG
BLK 130, SIMEI STREET 1
09-250
SINGAPORE 520130



Page 1 of 3

Invoice No.: 9-671-93156
Invoice Date: 23 Apr 2012
Account Number: NONE

GST Number: MR-8500398-9

For Invoice Inquiries/Questions:

Phone: 1800-743-2626
Fax: (65) 6823-7368

Internet: <http://www.fedex.com.sg>
Operating Hours: Mon - Fri (9am - 5pm)

DUTIES & TAXES INVOICE SUMMARY - 23 Apr 2012**International Services**

Inbound Shipment	Sub Total	(SGD)	75.47
Grand Total		(SGD)	75.47

Your payment is due upon receipt

Please make all enquiries/disputes within 30 days from the date of the invoice

Annual Rates Revision

With effect from January 2, 2012, our export and import shipping rates for both FedEx International Priority and FedEx International Economy services will be revised. We are committed to providing you with service excellence and reliability at cost-effective prices. For more details, please visit fedex.com.sg or contact our Customer Service team at 1800 743 2626.

Improved Transit Times to Greater Tokyo Areas

FedEx has improved the transit time of your inbound International Priority (IP) or International Economy (IE) shipments by one business day from all origins to selected areas in Greater Tokyo including western Tokyo, Yokohama (Tsurumi), and Saitama (Soka and Yashio).

For enquiries, please contact our Customer Service Team at 1800 743 2626 or visit our website at fedex.com.sg.

To ensure proper credit, please return this portion with your payment to Federal Express (Singapore) Pte Ltd. Please do not staple or fold.

Remittance Advice

CHUIGUAN NG
CHUIGUAN NG
BLK 130, SIMEI STREET 1
09-250
SINGAPORE 520130

INVOICE NUMBER	9-671-93156
INVOICE DATE	23 Apr 2012
ACCOUNT NUMBER	NONE
AMOUNT DUE (SGD)	75.47
BANK NAME	
CHECK NUMBER	

M/S Federal Express (Singapore) Pte Ltd
(Co. Reg. No. 198402740W)
Robinson Road Post Office
PO Box 927
Singapore 901827

For change of address, please complete the following

New Address:	
Contact No:	

221100000 967193156 00000000 000000007547 1

**TAX INVOICE
DUTIES & TAXES**

Customer Service Hotline
1800-743-2626

Page 2 of 3

GST Number: MR-8500398-9

Invoice Number 9-671-93156

Account Number NONE
Account Name CHUI GUAN NG

Detail by Payment Type

	<u>Ship Date</u>	<u>Sender (NYC)</u>	<u>Recipient (SIN)</u>	
Air Waybill Number	04/16/2012	CHRISTEEN JORNO	CHUI GUAN NG	
Service Type	791618621100	GDC	CHUI GUAN NG	
Pieces	IP BOX	10530 PORTAL CROSSING	BLK 130, SIMEI STREET 1	
Weight	1	SUITE 103	#09-250	
Bill To	0.9 kg	NEW YORK NY US 10014	SINGAPORE SG 520 130	
Shipper Reference	Consignee			
Delivery Information	04/20/2012 10:57	Other Charges	Singapore GST	65.47
	.NG CHUI GUAN	Other Charges	Duty Advancement Fee	10.00
FedEx Reference	IRSFED12D1915S-16574	Total		75.47
Dimension	18x12x3inch			

Minimum Billable Weight was applied

BILL CONSIGNEE Subtotal:**(SGD) 75.47**



GST Registration Number: MR-8500398-9

SUBSIDIARY IMPORT CERTIFICATE

(For OBC Shipment on FED19-APR-1215)

Consolidated Payment Declaration Date:
Consolidated Payment Declaration Number:19-Apr-12
FED12D1915**Handling Agent Name:**

Federal Express (S) Pte Ltd

Handling Agent Address:45 Airport Cargo Road
CIAS Cargo Centre S'pore (819478)**Serial No.:** I19791618621100**Mode of Export:** AIR**Master Air Waybill No.:** 02300095387**House Air Waybill No.:** 791618621100**Importer Name:**CHUIGUAN NG
CHUIGUAN NG**Item Description:**

FINISHED GOODS 7102390010

Importer Address:BLK 130, SIMEI STREET 1
09-250
SINGAPORE
SG 520130**Quantity:** 1**Total CIF Value (SID):** 935.31**GST Value (SID):** 65.47

*** This is a computer printed form No signature is required

COMMERCIAL INVOICE

(Please complete in print)

INTERNATIONAL
AIR WAYBILL NO.

8984-3780-8907

(NOTE: All shipments must be accompanied by a
FedEx International Air Waybill.)

DATE OF EXPORTATION

24-APR-2012

SHIPPER'S EXPORT REFERENCES (i.e., order no., invoice no.)

SHIPPER / EXPORTER (complete name, address, telephone, Business Registration No./
Customs / Tax ID No. e.g. GST / RFC / VAT / IN / EIN / ABN / SSN, or as locally required)

AMICA LAW LLC

30 Raffles Place

#18-03/04 Chevron House

Singapore 048622

Tel: (65) 6303 6210 Fax: (65) 6303 6222

CONSIGNEE (complete name, address, telephone, Business Registration No./ Customs /
Tax ID No. e.g. GST / RFC / VAT / IN / EIN / ABN / SSN, or as locally required)

DR. SIMON LAWSON

DTC RESEARCH CENTRE

BELMONT ROAD

MAIDENHEAD, BERKSHIRE SL6 6JW, UK

COUNTRY OF EXPORT

SINGAPORE

IMPORTER - IF OTHER THAN CONSIGNEE

(complete name, address and telephone)

REASON FOR EXPORT (e.g. personal gift, return for repair)

RESEARCH & DEVELOPMENT

COUNTRY OF ULTIMATE DESTINATION

UK

COUNTRY OF ORIGIN	MARKS/NO'S	NO. OF PKGS	TYPE OF PACKAGING	FULL DESCRIPTION OF GOODS To assist clearance times & reduce delay, the description should answer: What is it? What is it made of? What is it used for? What is it a component of? e.g.) Ladies' 100% Silk Knitted Blouse	HS CODE	QTY.	UNIT OF MEASURE e.g. pieces, units, set	WEIGHT lb / kg	UNIT VALUE currency	TOTAL VALUE
		01	BOX	DIAMOND - Research		01	01		USD	734.96
		TOTAL PKGS						TOTAL WEIGHT	CURRENCY	TOTAL INVOICE VALUE
		01							USD	734.96

Payment Method	Check one
<input type="checkbox"/> L/C	<input type="checkbox"/> F.O.B.
<input type="checkbox"/> T/T	<input type="checkbox"/> C & F
<input type="checkbox"/> Others	<input type="checkbox"/> C.I.F.
Check if applicable	

I DECLARE ALL THE INFORMATION CONTAINED IN THE INVOICE TO BE TRUE AND CORRECT.

SIGNATURE OF SHIPPER / EXPORTER

SEETHO HUI LING

NAME (PLEASE PRINT)

TITLE (PLEASE PRINT)

DATE

24-APR-2012

AMICA LAW LLC

Advocates & Solicitors
Patent, Trade Mark & Design Agents
Notary Public & Commissioner for Oaths

www.amicalaw.com

Tel +65 6303-6210

Fax +65 6303-6222

+65 6536-9332

30 Raffles Place
#18-03/04 Chevron House
Singapore 048622

Writer : Jason Chan / Winnie Tham
Direct Dial : (65) 6303 6215 / 6303 6217
Email : jason.chan@amicalaw.com /
winnie.tham@amicalaw.com
Our Ref : JC/WT/hui/2011 1829
Your Ref :

24 April 2012

Dr Simon Lawson
DTC Research Centre
Belmont Road
Maidenhead, Berkshire SL6 6JW
United Kingdom

BY COURIER

Dear Simon,

PROJECT SIPP

We refer to the above matter.

We enclose the following for your kind attention:

- (a) 1 piece of diamond – 0.40 ct ROUND DIAMOND Round 0.40 F IDEAL VS2;
- (b) IGI Report No. LG 10061905 dated 27 June 2011;
- (c) Copy of Invoice No. INV-REF/01-JAN-12/31;
- (d) Copy of Waybill No. 7916 1862 1100;
- (e) Copy of Packing Slip No. PL-5382; and
- (f) Copy of Private Investigator's Report dated 20 April 2012.

Yours faithfully



Encs



INTERNATIONAL GEMOLOGICAL INSTITUTE

Expertise issued by I.G.I.

589 Fifth Avenue, New York, NY 10017

Tel: (212) 753-7100 Fax: (212) 758-7759

www.igiworldwide.com

LABORATORY GROWN DIAMOND REPORT

DATE: 6/27/2011

REPORT NUMBER: LG10061905

DESCRIPTION:

LABORATORY GROWN DIAMOND

SHAPE AND CUTTING STYLE:

ROUND BRILLIANT CUT

MEASUREMENTS:

4.78 - 4.93 x 2.93 MM.

GRADING RESULT:

Carat Weight: 0.40 CT(S)

Color Grade: F

Clarity Grade: VS2

Cut Grade: IDEAL

PROPORTIONS:

Depth: 60.9%

Table: 59%

Crown Height % - Ang ° 14.0% - 33.0°

Pavilion Depth % - Ang ° 44.0% - 41.3°

Girdle: THIN TO MEDIUM

Culet: NONE

FINISH:

Polish: VERY GOOD

Symmetry: VERY GOOD

FLUORESCENCE:

NONE

COMMENTS: GIRDLE LASERSCRIBED "GEMESIS CREATED LG10061905".
THE LABORATORY GROWN DIAMOND DESCRIBED ABOVE IS CLASSIFIED
AS A TYPE IIA.

Red symbols denote internal characteristics (inclusions). Green or black symbols denote external characteristics (blemishes). Diagram in an approximate representation of this stone, and symbols shown indicate type, position, and approximate size of clarity characteristics. All clarity characteristics may not be shown. Details of finish are not shown.

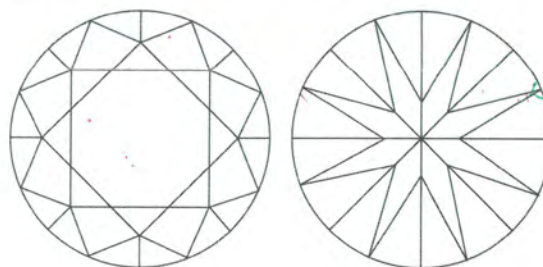


PHOTO ENLARGED

**COLOR
GRADING
SCALE**

CL	NC	FT	VLT	LT
COLORLESS D - F	NEAR COLORLESS G - J	FAINT K - M	VERY LIGHT N - R	LIGHT S - Z
FL	IF	VVS	VS	SI
FLAWLESS	VERY VERY SLIGHTLY INCLUDED	VERY SLIGHTLY INCLUDED	SLIGHTLY INCLUDED	INCLUDED
INTERNALLY FLAWLESS				

**CLARITY (10X)
GRADING
SCALE**

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THIS REPORT IS NEITHER A GUARANTEE, VALUATION NOR APPRAISAL OF THE LABORATORY GROWN DIAMOND DESCRIBED HEREIN.

INVOICE

Gemesis Diamond Company
10530 PORTAL CROSSING #103 LAKEWOOD RANCH
FLORIDA-34211 :USA
Phone: (941) 840-6000
Fax: (941) 840-6019
Email : www.gemesis.com

**Invoice No #:** INV-REF/01-JAN-12/31

Date : 04/16/2012

Customer PO#**Payment Terms :**

Shipped Via :

Sold To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

Ship To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

All Prices in

#	Style#	Customer Style #	Qty	Carat Weight	Description	UOM (Each or Per Carat)	Unit Cost	Total Cost
1	D000000000000000006173 DM-RND-VS2-H-4.80MM (4.7-4.95)-VGD-NONE-NONE		1	0.400	LG10061905	Per Pieces	\$734.96	\$734.96
Notes :								
Tracking#		1	0.400	Subtotal				\$734.96
				TOTAL DUE				\$0.00

THANK YOU FOR YOUR ORDER.

Disclosure: All diamonds from Gemesis are lab-created, guaranteeing a socially and ecologically responsible point of origin.

Page 1 of 1

arising from the disclosure or publication of this report or any part thereof.

From: Origin ID: BOWA (941) 840-6008
CHRISTEEN JORNO
GDC
10530 PORTAL CROSSING
SUITE 103
LAKEWOOD RANCH, FL 34211
UNITED STATES



Ship Date: 16APR12
ActWgt: 1.0 LB
CAD: 4490707/ESDS0400

REF:
DESC-1: Finished Goods 7102390010
DESC-2:
DESC-3:
DESC-4:
EEI: NO EEI 30.37(a)
COUNTRY MFG: IN
CARRIAGE VALUE: .00 USD
CUSTOMS VALUE: 734.96 USD
T/C: O 399105803 D/T: R
SIGN: CHRISTEEN JORNO
EIN/VAT:
PKG TYPE: BOX

SHIP TO: 6598194467

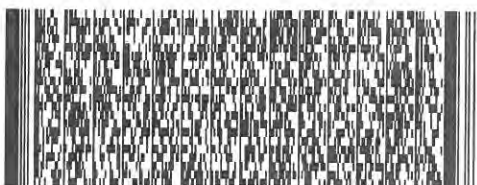
BILL THIRD PARTY

Chuiguan Ng
Chuiguan Ng
Blk 130, Simei Street 1
#09-250

Singapore, 520130
SG

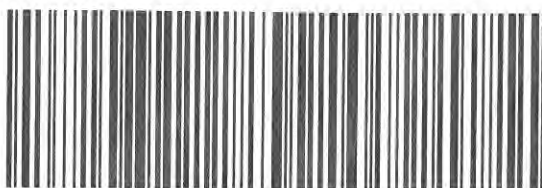
TRK# 7916 1862 1100
0430

INTL PRIORITY **A1**



X2 SINA

520130
-SG
SIN



These commodities, technology, or software were exported from the United States in accordance with the export administration regulations. Diversion contrary to United States law prohibited.

The Warsaw Convention may apply and will govern and in most cases limit the liability of Federal Express for loss or delay of or damage to your shipment. Subject to the conditions of the contract.

CONSIGNEE COPY - PLEASE PLACE IN POUCH

Luxury has evolved

Packing Slip# PL-5382 Order # 100005382 Order Date 04/16/2012 12:00:00AM									
SOLD TO:					SHIP TO:				
Chuiguan Ng Blk 130, Simei Street 1 #09-250 Singapore, 520130 SG Contact# Fax #:					Blk 130, Simei Street 1 #09-250 Singapore, 520130 SG Contact# Fax #:				
PAYMENT METHOD:					SHIPPING METHOD:				
Credit card					Shipping Fedex				
Qty	Category	Title	SKU/Stock No/Slash No	Size	QLTY	CLR	Certificate No	Metal kt/Color	Amount
1		0.40 ct ROUND DIAMOND	D000000000000000000000006173		VS2	F	LG10061905		734.96

Thank you for choosing Gemesis

All amount include taxes where applicable

If you have any questions about your order please contact us at customerservices@gemesis.com or speak to one of our Diamond & Jewelry Consultants at 866-799-8885(24x7).

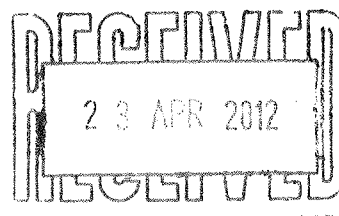
HS INTELLECTUAL PROPERTY SERVICES

101 Upper Cross Street
#04-38, People's Park Centre
Singapore 058357
Telephone : (65) 6533 1248
Facsimile : (65) 6533 9210

Our reference : HS/IP/038/12

20 April 2012

Mr Jason Chan
M/s Amica Law LLC
30 Raffles Place, #18-03/04
Chevron House
Singapore 048622.



Dear Sirs,

GEMSEIS DIAMOND COMPANY
TRAP-PURCHASE

We refer to your recent instructions to our firm to conduct a trap-purchase of a diamond from the aforementioned United States of America incorporated business entity.

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Cut	: Ideal
Clarity	: VS2
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contd /Page 2

HS INTELLECTUAL PROPERTY SERVICES

HS/IP/038/12 Page 2

The FedEx package containing the order (unopened) is forwarded together with this report for your necessary attention.

Should you have any other queries concerning this matter, please contact us.

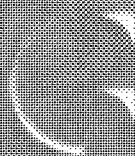
Our invoice billed for the services rendered in the conduct of this matter is also enclosed hereto for your kind attention.

Yours sincerely,



Ng Chui Guan
for HSIPS

enc : Order confirmation email from Gemesis Diamond Company
Invoice from Gemesis Diamond Company
HS invoice HS/028/12



Hello, Chuiguan Ng

Thank you for your order from Gemesis. Once your package ships we will send an email with a link to track your order. If you have any questions about your order please contact us at customerservice@gemesis.com or call us at 888-799-8885 24/7.

Your order confirmation is below. Thank you again for your business.

Your Order #100005382 (placed on April 16, 2012 8:05:10 AM EDT)

Billing information:

Chulguang Ng
Blk 130, Simai Street 1
#09-250
Singapore, 520130
Singapore
T: 6598194487

Payment Method:

Credit Card
Credit Card Type:
Visa
Credit Card Number:
XXXX-XXXX

Shipping information:

Chuiguan Ng
Blk 130, Simai Street 1
#09-250
Singapore, 520130
Singapore.
T: 6598184467

Shipping Method:

International - FedEx

[illegible]

THEORY OF THE CASE

INVOICE

Gemesis Diamond Company
10530 PORTAL CROSSING #103 LAKEWOOD RANCH
FLORIDA-34211 :USA
Phone: (941) 840-6000
Fax: (941) 840-6019
Email : www.gemesis.com

**Invoice No #:** INV-REF/01-JAN-12/31

Date : 04/16/2012

Customer PO#**Payment Terms :**

Shipped Via :

Sold To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

Ship To

Chuiguan Ng

Blk 130, Simei Street 1 #09-250
Singapore, 520130 SG
Contact#

All Prices in

#	Style#	Customer Style #	Qty	Carat Weight	Description	UOM (Each or Per Carat)	Unit Cost	Total Cost
1	D000000000000000006173 DM-RND-VS2-H-4.80MM (4.7-4.95)-VGD-NONE-NONE		1	0.400	LG10061905	Per Pieces	\$734.96	\$734.96
Notes :								
Tracking#		1	0.400	Subtotal				\$734.96
				TOTAL DUE				\$0.00

THANK YOU FOR YOUR ORDER.

Disclosure: All diamonds from Gemesis are lab-created, guaranteeing a socially and ecologically responsible point of origin.

Page 1 of 1

arising from the disclosure or publication of this report or any part thereof.

This is the Exhibit marked “SFW-38”

referred to in the Affidavit of

Susan Jane Fletcher Watts

affirmed in the United Kingdom

on this 27 day of March 2018

Before me



A NOTARY PUBLIC

RICHARD GARETH GRIFFITHS
Solicitor & Notary Public
Downend Lodge
Chieveley
ENGLAND RG20 8TN

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Gem Quality

Diamonds have always been known for their beauty and mystery. The diamond is a transparent jewel with unparalleled brilliance and fire, reflecting more light than any other gem in the world. It has captured the hearts and imaginations of generations of women and its aspirational value only grows year after year.

The beauty of the diamond roots in its physical characteristics. There is no material in the world that can match it, except itself. Grown diamonds have the same optical, physical and chemical properties as a mined diamond.

LAB CREATED vs MINED

Diamonds	Chemical Composition	Crystalline Structure	Refractive Index	Dispersion	Hardness	Density
LAB CREATED	C	CUBIC	2.42	0.044	10	3.52
MINED	C	CUBIC	2.42	0.044	10	3.52

The mystery of a diamond comes from the history of each diamond. The youngest diamonds is thought to be almost 900 million years old. This is made possible by one simple fact; the diamond is the hardest material on the planet and this allows for it to survive through these years. For Nature to do this 200 km underground is amazing, and to see Nature work in our back yard is as romantic and mysterious as it is humbling. We are privileged to be at the beginning of its creation.

Jewellery using diamonds grown by Ila technologies are available through our partner Gemesis at www.gemesis.com

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This site is used to chase the redirection of URLs. Feel free to use this site at will.

Usage:

Enter a URL in the box to the right. The headers of each redirection will be displayed below.

Redirect Trace:

Results:

<http://www.gemesis.com>

HTTP/1.1 301 Moved Permanently

Date: Thu, 24 Mar 2016 09:52:09 GMT

Server: Apache

Location: <https://www.puregrowndiamonds.com/>

Cache-Control: max-age=300

Expires: Thu, 24 Mar 2016 09:57:09 GMT

Vary: Accept-Encoding

Content-Length: 242

Content-Type: text/html; charset=iso-8859-1

<https://www.puregrowndiamonds.com/>

HTTP/1.1 200 OK

Date: Thu, 24 Mar 2016 09:51:56 GMT

Server: Apache/2.2.29 (Unix) mod_ssl/2.2.29 OpenSSL/1.0.1e-fips mod_bwlimited/1.4 PHP/5.4.36

X-Powered-By: PHP/5.4.36

Set-Cookie: frontend=44e766f1ae617f791753d4262ea08282; expires=Fri, 25-Mar-2016 09:51:57 GMT; path=/
Cache-Control: max-age=0, no-cache, no-store, must-revalidate

Expires: Wed, 11 Jan 1984 05:00:00 GMT

Vary: Accept-Encoding,User-Agent

Pragma: no-cache

Transfer-Encoding: chunked

Content-Type: text/html; charset=UTF-8

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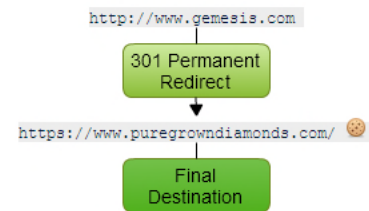
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DIAMONDS, GEMS AND JEWELRY

THE MYSTERY OF TWO GEMESIS COMPANIES UNDER ONE HAT 22.05.12

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The alert by the DTC to its sightholders notes that the undisclosed synthetic diamonds submitted to the IGI and other labs have characteristics similar to known Gemesis laboratory-grown materials, a conclusion based mostly on scientific literature. Diamond Intelligence Briefs has therefore made an effort to investigate whether, for all practical purposes, it could be possible that non-disclosed [polished](#) made from Gemesis-grown synthetics could be available in the market. Our investigation led us in strange directions. Chaim Even-Zohar's report follows:



Enlarge +

Chaim Even-Zohar

According to its website, "Gemesis is the principal producer of gem-quality lab-created diamonds and jewelry. Available in the purest Type IIa colorless and rare fancy yellow colors, these diamonds possess the same exceptional cut, color and clarity, as well as identical chemical, optical and physical characteristics as the highest-quality mined [diamonds](#) – the only differentiator is point of origin."

Continues the website: "Privately-held, Gemesis has the world's largest facilities comprised of High Pressure-High Temperature (HPHT) and Chemical Vapor Deposition (CVD) diamond production. Using these methods, Gemesis is able to bring to market high-quality colorless and fancy color diamonds that have all the beauty of their mined counterparts and offer tremendous value when compared to mined diamonds with the same characteristics."

In terms of product disclosure, Gemesis states that its "lab-created diamonds are certified by an independent third-party institute [i.e. IGI, New York. Editor]. Each polished diamond over one-quarter

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131.44 (0%)

World Clock

Hong Kong	18:10
New York	05:10
Mumbai	15:40
Jerusalem	12:10
Brussels	11:10
Moscow	14:10

carat in weight comes with a diamond grading certificate. Gemesis is committed to maintaining supply chain integrity and providing knowledge of origin of its products.”

The company's current Chief Executive Officer and President is Stephen Lux, who joined the company in November 2006. The current marketing model of Gemesis calls for the selling of synthetic polished through a website – but that method has only been in operation for a few months. An analysis of its website shows an online stock of some 3,200 colorless stones of which 3,000 are in the 0.30-carat – 0.80-carat range. It also has some 820 fancy stones on offer, 500 of which are in the 0.5-carat – 1.0-carat range.

Selling prices seem to be about 50-60 percent below their natural counterparts. A back-of-the-envelope exercise as to what these stocks might be worth at production costs would draw one to conclude that the company's unsold inventory is worth less US\$2 million, at best.

Background on Gemesis

The Gemesis Corporation was incorporated in the state of Delaware, USA, in 1996. At that time, Thomas V. Buffet and Carter W. Clarke were co-chairmen. Clarke, a retired Brigadier-General, had stumbled on a synthetic diamond-growing machine in Russia; he bought it and that was the beginning of the company. It had then two Russian directors, Vladimir V. Kozlov and Yuri K. Semenov, who had brought the Russian HPHT technology to Florida, where the Gemesis headquarters and synthetic production facilities were established.



Stephen lux

Enlarge +

It took the company about seven years to get its synthetic production on stream. By 2003, it had 23 diamond-growing machines with a combined capacity of 30,000 carats of rough per year. By 2008, an annual production capacity of 100,000 carats had been reached. In that year, its building facilities were greatly expanded. Gemesis also produced its first 7-carat rough stone.

In terms of pricing its polished stones, in 2006, its vice president for marketing, Chuck Meyer, said in an interview: “we found that a price point roughly 70% less than the price of comparable mined diamonds was extremely attractive to the consumer. We're able to hold that price point while still providing margin.” However, Meyer was gone before the interview was published....

In these years, Gemesis was selling both polished and rough to the [trade](#). The Renaissance Diamond Corporation, for example, was one of those holding a rough purchasing contract from 2007. There were more. When the economic crisis commenced in 2008, things went southward. By 2010, Gemesis was in dire financial trouble.

Jatin Mehta's Family Bails Out Gemesis in 2010

In phone interviews and in several e-mail exchanges over the past few days, Gemesis Chief Executive Officer Steve Lux was extremely protective about proprietary information of, what he said, is a private company. Lux was unwilling to talk about shareholders. In a transparent good-governance environment, especially in the diamond industry, visibility on shareholders instills confidence. Hiding such information leads to suspicions and market gossip. (It must also not be ignored that in the current environment of anti-money laundering and the combating of terrorist financing (AML/CFT), diamond merchants – as high-value dealers – must conduct due diligence (Know Your Client) on trading partners as called for by national legislation in many countries and according to FATF rules. In the case of trading with corporate entities, knowing the beneficiary owner is of utmost importance.)

Documents in our possession show that a bailout of the company took place in January 2010, when Jatin R. Mehta, the principal of Su-

Raj Diamonds, a public company in India, acquired a controlling interest in Gemesis through his son, Vishal. The new owner committed to investing US\$8.4 million into Gemesis over a period of three years. In return, he received 50.1 percent of the company's equity on a fully diluted basis. Mehta assumed hands-on control, making all major decisions.

Jatin Mehta is a formidable force in the diamond business, which he joined in 1974. In 1986, he was one of the first entrepreneurs that took his diamond business public in India. In the late 1980s and early 1990s, Jatin served as Chairman of the Gem & Jewellery Export Promotion Council (GJEPC) of India. He is legendary for his excellent relations with Indian government ministers and other top politicians. Some five years ago, he started to lobby government and the GJEPC on synthetic diamond-related issues. The day-to-day management of Gemesis is vested in Vishal Mehta and his wife, Sonia.



Enlarge 

Gemesis Florida

A few months after assuming control, the new owner changed the name of the company from The Gemesis Corporation to Gemesis Diamond Company.

Moving Synthetic Production to the Far East

Mehta wanted to move out of the United States to be closer to the production facilities. As such, towards the end of 2011, all the diamond growth chambers hitherto located in Lakewood Ranch, Florida, were relocated to Malaysia. Apparently, it was also felt that the company's intellectual property was better protected there; production costs would come down as well. Moreover, as Lux told shareholders, "as plant expansion is implemented, government financial incentives will benefit the Company." The Malaysia facility thus houses the HPHT synthetic diamond-growing chambers.

A casual internet search shows a handful of recruitment advertisements from the Gemesis Malaysia Sdn Bhd for a wide range of administrative and technical positions for the company's new facilities located at the Prai Industrial Estate in Prai Pulau Penang.

In the meantime, the Gemesis headquarters and production facility located in Sarasota, Florida, have been closed. A skeleton staff remains in a different Florida location, where mainly the administration, marketing and research and development functions are housed. In its new business model for the United States, Gemesis has established its order fulfillment center in New York – just for serving website online orders.

Gemesis: Selling Rough and Polished

The company seems to be changing its business model and now aims to sell directly to consumers. In an update to shareholders, dated November 2011, Steve Lux reports that "the company has been working nonstop to properly complete and launch our new e-commerce website. It was the desire to report that the new Gemesis website, which would facilitate the sale of our diamonds and jewelry directly to consumers, was up and running. However, that event has yet to occur."

That is a significant message. How did Gemesis market its output throughout 2011 when its equipment (dozens of grow chambers) was moving to Malaysia, its new e-commerce model wasn't operational yet, and when it really needed cash flow?

Lux provided his remaining minority shareholders with an answer in his report on the company's operations for the first nine months of 2011: "Sales of the Company products

have been limited during this period, as shown on the attached financial reports, which primarily reflect limited rough diamond sales with long term customers and some direct sales of the select polished diamonds. This is expected to change dramatically once the new website is activated and sales to retailers is slowly but carefully expanded."



Gemesis

Enlarge

[Yellow diamonds](#)

Thus, there were rough diamond sales to long-term customers and some sales of select polished diamonds. Actually, there were mostly synthetic rough diamond sales. There is nothing wrong with that – synthetic producers are allowed to sell their output to anyone they want. Rough sales are consistent with the company's old business model. Its new model isn't yet operational – or wasn't at the end of 2011, when Lux wrote his report.

As synthetic rough was sold, it is, theoretically and practically, quite possible that there could be Gemesis polished on the market that doesn't carry the disclosure inscription, and it therefore may be sold by unscrupulous persons. From a good governance perspective, there would have been an opportunity for Gemesis to offer assistance in finding out if something like this could have happened. At the end of the day, unscrupulous sellers of the Gemesis product without disclosure would inflict enormous damage on Gemesis itself.

However, when Lux learned about us holding information on Gemesis rough sales, he reacted as follows: "I am not sure what 'information' you are referring to, but if it is an internal shareholder report or something similar, you are drawing an incorrect conclusion. For internal accounting procedures and cost analysis purposes, we record the conversion of rough to polished as a 'sale and buyback'."

We informed Lux that his reply is wholly inconsistent with our information, nor could we see any sales and subsequent buy backs in the company's financial reports. Other sources familiar with Gemesis confirmed to us that rough sales did take place. Also, it doesn't make sense for Gemesis to buy anything back – as it was (and is) operating deeply in the red. It needs any sale it can get. (Out of respect to Jatin Mehta, we will refrain from publishing the detailed financials; Steve can do so himself, if he wishes.)

Lux stresses "with respect to end sales to our consumers via the website or to the trade in limited quantities, we sell ONLY polished diamonds." The reality is that the sales portion of their website has only been operational for a couple of months. That's semantics. We are mainly interested in the period before the e-commerce website became operational.

Singapore: NOT Related to Gemesis USA

There is some mystery around the company's Singapore operations. When I interviewed Steve Lux, I asked him several times whether he was also the Chief Executive Officer of Gemesis in Singapore. He avoided straight answers. He merely assured me that he is fully in charge of global Gemesis man-made diamond sales.

Recruitment ads for the Singapore facility state as follows: "The Gemesis Company (S) Pte Ltd is involved in production of very high quality diamond crystals. The Company uses chemical power vapour deposition technique to grow these crystals. These crystals are cut into rectangular shape of typical sizes and prepare for industrial use such as heat sinks for mounting high power laser diodes and integrated chips. We also endeavor to develop optical grade diamond crystals for gem and other commercial application. The Company is currently located in Woodlands,



Gemesis

Enlarge

[Gemesis stones](#)

Singapore and is planning to expand into a Multi National Corporation based in different countries.”

A few things are of significant interest here: Singapore is a CVD facility, while Malaysia houses the HPHT capabilities. The ownership and management of the Singapore entity seems (and is) different from that of the Gemesis Diamond Company. Mumbai market sources tell me about a renowned nuclear scientist that is now working with Jatin Mehta – clearly Mehta’s entrepreneurial skills are only second to his preference for low-profile secrecy and staying below the public radar.

The Malaysia recruitment ads invariably state proudly: “Gemesis is the world’s leading producer of HPHT gem quality cultured diamonds with its headquarters situated at Florida, USA.” None of the Singapore company’s ads make any reference to the U.S. company. (Needless to say that Jatin Mehta didn’t respond to my e-mails.)

Gemesis Singapore Directors and Shareholders

Let there be no illusion among Gemesis Diamond Company shareholders: they are not direct shareholders of the Singapore company. Corporate records list only two shareholders: Sonia Jatin Mehta and JRD International Limited. (JRD is an offshore company located in Nassau.)

Lux had good reasons to avoid a straight answer: he himself is not even on the board of Gemesis Singapore. That separate company has five directors: Vishal Jatin Mehta, Sonia Jatin Mehta, Jocelyn Yap Ching Ching, Girija Prasad Pande and Michael Nguan Tan Teck.

In recent interviews (in the general Indian press), Lux stresses that Gemesis will only sell to retailers and consumers in the United States. We conjecture that Jatin Mehta has divided the markets: The Florida Gemesis (with the Malaysia facility) will serve the United States. Singapore will take care of the rest of the world. (Lux disagrees with my conclusions; see below for his comments.)

Gemesis in the United States concluded at the end of 2011 another agreement with a “strategic investor” – this time for US\$60 million, to be paid over a period of 18-24 months. No, I don’t know who it is – but it is a safe bet that his/her last name is Mehta.

The old traditional founding Gemesis shareholders have, by now, been diluted to near to nothing. (Unless, of course, they exercised a rights issue - a one-time opportunity that was offered to them to purchase shares at the same price as the strategic investor to maintain their present level of ownership at the conclusion of the aforementioned agreement.)

Remaining minority shareholders must have been happy to learn from Lux that almost two decades after its founding, the company now has “a realistic probability of achieving the objective it set for itself upon inception, to become the undisputed global leader in the field of laboratory-grown diamonds and to become a major presence in the global diamond industry.”

An innocuous remark in the DTC alert to sightholders on the similarity of characteristics found between lab descriptions of the undisclosed polished synthetic stones submitted to some labs and the available scientific literature, which led us to look at Gemesis to begin with, may not (yet) have led us to the answers we were looking for. However, what we discovered certainly widens the market’s understanding of Gemesis. From now on, any time one looks at synthetics and contemplates that they might come from Gemesis, the right question to surely ask is: “which Gemesis?”

Transfer Pricing Aspects

Gemesis synthetic diamonds may be subjected to both CVD and HPHT synthesis. The sale of the company’s Singapore production, as Stephen Lux has clarified, is part of the global (i.e. U.S.-managed) distribution network. As Singapore Gemesis and USA (Delaware) Gemesis are not owned by the same ultimate beneficiaries, the issue of transfer pricing (i.e. profit shifting) becomes quite relevant.

Transactions between Singapore and the USA must take place on an arm's length basis – as if they were made between unrelated parties. Are there other CVD and HPHT “service” arrangements with clear market pricelists enabling the comparing of arm's length prices? Gemesis minority shareholders may take comfort in knowing that the Inland Revenue Authority of Singapore (IRAS) has issued stringent Transfer Pricing Rules that are embedded in the Income Tax Act (SITA). Nevertheless, this aspect should be considered by minority shareholders whenever a rights issue comes up. Probably, the sooner minority shareholders are “bought out,” maybe the better it is... for all.

Comments by Gemesis CEO Stephen Lux

“Dear Chaim,

I appreciate that you are sharing your journalistic instincts with me, and that perhaps leads you to certain assumptions. However, such assumptions will carry some degree of risk of being wrong – very wrong – and won't solve the problem at hand.

As you state, Gemesis has been guarded in any information that we share about the company, our structure, investments, and overall capabilities. That is our right as a private corporation. However, we have also been the only one to truly be forthcoming about exactly what we are selling to the public. We both know there are several other companies that are practicing the CVD technology, with some scale as to have capability for the few hundred diamonds that most unfortunately have been sold inappropriately.

You, as well as DTC and IGI, know that CVD diamonds, whether made by Gemesis or others, will be indistinguishable from each other. The fact that Gemesis has been the most open in terms of working with the grading labs, and then going through the step of certification (and laser engraving the source) for several thousand of our diamonds, seems to be the greatest reason for your assumptions.

Gemesis has been very consistent and clear in our commitment of full disclosure. That has not and will not change. We have the very same concerns as you and the entire mined diamond industry have regarding the attempt by someone to inappropriately and fraudulently pass lab created diamonds as mined. We also hope that this unfortunate event will encourage the industry as a whole to be more proactive in assuring the success of lab created diamonds in the right way. The Gemesis way. All of the other “players” who have had some degree of success need to come from underground and you need to help in that matter. A constant atmosphere of controversy and angst is not conducive to this happening in an open manner.

Finally, I will state to your various observations the following. Yes, it is true that Gemesis was on the brink of bankruptcy at an earlier period. You can see now that the company is moving forward and becoming well known. The expenditures on the website, marketing efforts, capacity and stockholding are now significant. The Company has a long term focus consistent with the evolution of the growing presence of lab created diamonds. I can assure you with 100% certainty that Gemesis has not been involved in selling rough diamonds as mined, and the undisclosed diamonds referenced in the DTC and IGI alerts are not Gemesis diamonds. All of our diamonds grown globally are sold through the U.S. as polished diamonds. While the American market was the initial target, the international interest has been significant, and we have since modified our sales practice to ship virtually worldwide.

Just because an unscrupulous supplier may have CVD diamonds that demonstrate the high quality of Gemesis does not mean they are Gemesis. We would be most interested in learning about any further developments.”

Stephen Lux

[Courtesy of Diamond Intelligence Briefs](#)

By: Chaim Even-Zohar



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11 October 2012

Vol.27 ♦ No.728

*By Chaim Even-Zohar*

Jatin Mehta: New Global Gem-Quality Synthetic Diamond Czar



The four last remaining officers and directors of the **Gemesis Diamond Company**, as well as most of the U.S. gem-quality synthetic diamond producer's shareholders, have been compelled to sell all their shares to a newly created Delaware company called **Gemesis Acquisition Corporation**. This new "parent" company made an offer of US\$0.30 per share to purchase the some 40 million outstanding shares (!) held by groups of shareholders of the company founded by General **Carter W. Clarke** and members of his family in 1996.

The exodus of the old shareholders from Gemesis was completed on 12:01 AM, September 24, 2012, when "all shares

have been automatically cancelled and ceased to exist." Some of the long-time minority shareholders bitterly lament that, due to dilution and the low appraisal of the share value, they are getting about 1/150th of their original investment. Many may even have lost more.

Though the documents reaching the shareholders don't specifically state the identities of the promoters, it is clear that this action was initiated by the 50.1 percent shareholders of Gemesis, i.e., the **Jatin Mehta** family and associated parties. Formally, without needing consent (apparently) from minority shareholders, the Gemesis Diamond Company has merged with

the Gemesis Acquisition Corporation, the parent. All stocks of the "parent" were converted into common stocks of Gemesis. However, the holders of the Gemesis common stocks were only given the choice to accept US\$0.30 cash, upon surrendering of the certificate. Their journey with Gemesis is over.

The 'Rescuing Angel' Took it All...

What preceded this exodus? Let's look at the background. Gemesis, according to its own website, is the "principal producer of gem-quality lab-created diamonds and jewelry" and "has the world's largest facilities comprised of High Pressure-High Temperature (HPHT) and Chemical Vapor Deposition (CVD) diamond production." Indeed, in the past decade, Gemesis has been selling considerable amounts of gem-quality rough and polished diamonds to the international markets.

In early 2010, **Florida**-based Gemesis had been teetering on the edges of bankruptcy. Not because the business was a disaster (it was actually picking up), but because the company faced cash-flow challenges and had defaulted on a loan. Jatin Mehta (directly or indirectly) came in as a "rescuing angel" agreeing "to invest US\$8.4 million over the next three years." (As these shares were to be purchased over a period of 18-24 months, it must be assumed that, by now, these shares have been fully paid for.)

After Jatin Mehta came in, the Gemesis board informed shareholders that "the investment agreement provides a consistent source of capital for Gemesis as we retool the Company with the objective to further reduce our production costs and expand our market." What the shareholders apparently didn't know is something DIB disclosed earlier this year, namely, that Jatin Mehta created an additional

synthetic production company (based on CVD-technology) also named Gemesis, in **Singapore**. (See "The Mystery of Two Gemesis Companies under One Hat," DIB #709, May 21, 2012.) Jatin Mehta, apparently, saw the "growth" of the Gemesis company not in the U.S.-based company (in which there are 49.9 percent minority shareholders), but rather in the 100 percent-family owned Singapore Gemesis.

The terms of the January 31, 2010, equity agreement (the entry of the "angel" agreement) provided Jatin Mehta with "the ability to appoint a majority of the board of directors during the term of the investment." Oddly, he chose not to exercise that right. He didn't need to, though, as it soon became apparent that his CEO, **Stephen Lux**, and CFO, **Bernard A. "Skip" Wagner**, both Gemesis shareholders and directors, were faithfully looking after his interests.

That by itself still may become a point of contention in the near future in a Delaware courtroom, where Gemesis shareholders still have some hundred days to file a petition demanding a determination of the fair value of the shares which they had to sell for \$0.30 per share. The Gemesis board consists of only four individuals: Gemesis founder **Carter W. Clarke**, **Gene Josephs**, Lux and Wagner. In a note to the Gemesis shareholders, it states "the Board of Directors of Gemesis has determined that US\$0.30 per share is fair value." There was no explanation at all on how they arrived at that price.

Losing \$1 on every \$1 sold?

When the Jatin Mehta family made the aforementioned US\$8.4 million investment in Gemesis, this was based on US\$0.40 a share – which represented a "distress" value as the company would otherwise undoubtedly have faced bankruptcy. Since then, promising developments in the company have taken place – including the relocation of production facilities to Malaysia and the launch of an internet sales website.

However, the opaque corporate structure and possible transfer-pricing issues, or internal group accounting, may have eroded the value of the U.S. Gemesis company. Or is that erosion only on "paper"? Just to illustrate: the last available financial records are for the first nine months of 2011. In that period, the U.S. Gemesis company reports total sales of merely US\$2.24 million, at a cost of sales of US\$4.32 million. In the first three quarters of 2011, the diamond market was buoyant. Why would someone sell for US\$2.24 million at loss margins of US\$2.08 million?

Selling at a great loss is sometimes unavoidable when one needs cash. But in the same reporting period, the Gemesis cash position doubled from US\$617,000 to



Jatin Mehta



Stephen Lux



US\$1.27 million. Why sell a diamond if, for every dollar sold, you lose an additional dollar? After all, the company has a good product and shouldn't worry about inventory depreciation. Maybe the cost of sales was inflated? It may have included expenses incurred in the "other" Gemesis?

The Jatin Mehta Impact on Gemesis USA

When shareholders agreed to have an Indian diamond and jewelry tycoon as majority shareholder, they had all the reasons to believe, to quote the relevant document, that they had a "consistent source of capital" to expand the company's activities.

So what happened between Jatin Mehta and the Gemesis minority shareholders? In an e-mail to Chairman Clarke we noted that some of the shareholders are wondering whether the extensive Singapore businesses value – which the majority shareholder has established using the Gemesis brand, promoting his [own] business by using the Gemesis name, using the know-how, expertise, etc., are also reflected in this low company valuation? If the name Gemesis helped the growth of the Singapore company, shouldn't there be a benefit to the "original" Gemesis? (See related box.)

A back-of-the-envelope calculation will show that the Jatin Mehta family paid US\$8.4 million for 50.1 percent of the Florida-based Gemesis company two years ago, and is now paying US\$6 million to buy out the remaining 49.9 percent minority shareholders and management. In other words: the company value is about 30 percent lower today than the "distress" value which the company had when Jatin came to rescue the cash-flow and protect the company against aggressive lenders to whom it had defaulted.

The last available balance sheet shows some US\$11.6 million in assets, including US\$7.5 million in property and equipment, and some US\$3 million in cash, receivables and inventories. At US\$2.4 million liabilities, the company was virtually debt free. At US\$0.30 per share – it's a steal.



Gemesis Florida Lab Facility

Business Improved Prior to Jatin Mehta's Entry

The Gemesis business proposition makes sense and the company also had good years. In the first eleven months of 2008, for example, which was a bumper year for jewelry sales, the company was quite profitable. It sold US\$7.5 million worth of rough and polished at an operating margin of 26 percent.

In 2009, like the rest of the diamond world, Gemesis revenues plunged. Its total sales came to only US\$1 million, but towards the end of the year – just before Jatin Mehta came in – the company was improving nicely. A clearly confident Stephen Lux then told shareholders that "the majority of these [2009] sales were in the last four months of the year. They represented a mix of polished and rough sales. Essentially, all sales were overseas in end markets such as Israel, India, China, and other south east Asian countries, suggesting the resistance to cultured or lab-grown diamonds may be less there. A significant polished sale was made in Canada," he added.

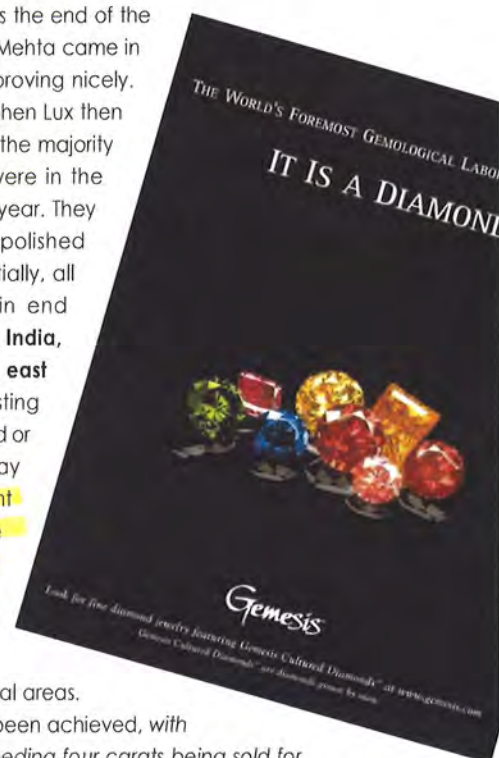
"The technology effort continues to be effective with significant gains in several areas. Larger diamonds have been achieved, with high quality stones exceeding four carats being sold for the first time," said Lux at that time. "Process improvements to achieve a more uniform yellow color are being implemented. Finally, blue diamonds are being produced in limited commercial quantities," he added.

The problem was cash – not business. So why did the business sour after Jatin Mehta assumed control? Or didn't it? We don't know – but neither do the minority shareholders who are now forced to sell their holdings in Gemesis.

Questioning the Company Appraisal

Jatin Mehta is a successful and accomplished business man. If he and/or his family, within two years after making his initial entry, succeeded in getting total 100 percent control and ownership, one can only salute him.

Minority shareholders, however, raise serious questions about the behavior of their board. In our e-mail to Chairman Carter Clarke, we conveyed that some stakeholders believe that there had been a "grand design" to get them all out (or ousted) from



the moment the Jatin Mehta family came in. We didn't receive a response.

Disenfranchised minority shareholders are asking questions. No explanations for the valuation were given; to the contrary. Shareholders were told that the old September 2011 financials that had been previously presented to the shareholders "are the most recent financial statements that have been prepared by Gemesis in connection with an annual report." (These were figures DIB reported already in May.)

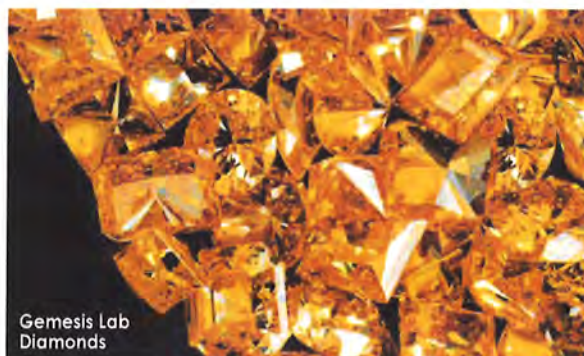
Board members have a fiduciary duty to always act for the good of the organization, rather than for the benefit of themselves. It is, therefore, also interesting to see whether any of the current officers will feature again in the future Gemesis – or maintain their positions, even though they have sold their shares.

As already mentioned, unhappy shareholders have still some hundred days to file a petition in a Delaware Court demanding a determination of the fair value of the shares. The current management and board members have indicated that "Gemesis is under no obligation to and has no present intention to file such a petition." So if the majority shareholder imposed a certain value, the board clearly (and freely) agreed to it as well.

Respecting the Privacy of Private Companies

There is considerable incongruity between the Gemesis name-recognition, its perceived impact on the market, the stories conveyed to the international press, and the figures which are reflected in the financial documents.

As CEO Stephen Lux has made clear many times, Gemesis is a private company and their internal affairs are none of our business. I am the first to say that Lux is absolutely right. But the very moment Gemesis and/or its majority shareholder seems to



be involved in unethical, if not fraudulent, business practices by engaging (or allowing others to engage in) the selling of their synthetic diamonds as natural diamonds, they forfeit the right to privacy.

If the trust and confidence of the consumer in diamonds is being endangered, the company's affairs become a matter of great concern to all of us. As trade journalist, we will continue to find any piece of information our readers need to know – to protect their own and industry's interest and integrity.

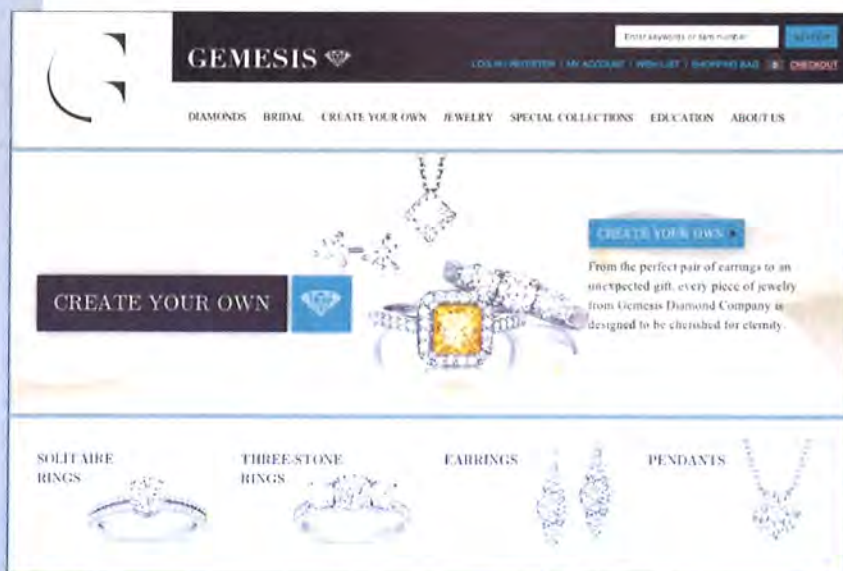
The New Synthetics Czar

It seems that, shortly, **Jatin Mehta** will emerge as the world's dominant *Gem Quality Synthetic Diamond Czar*. His market position will make him the synthetics price-setter. Unless, of course, De Beers' Element Six gets into the market – something that doesn't see imminent.

Formally, the **Gemesis Diamond Company** has now merged with the **Gemesis Acquisition Corporation**. It seems logical to expect that the other Gemesis companies (Singapore) will somehow also be merged in the same company. This will greatly enhance efficiencies, transparency and governance.

We have always championed the case for synthetics, cultured or man-made diamonds to become an integral part of the diamond market. The product is beautiful; there is considerable demand for it – and it has a great future. Jatin Mehta has now a splendid opportunity to "disassociate" himself from some of the past "mishaps" and use his new position to become the market leader in gem quality synthetics – and also be the leader in terms of the highest standards of disclosure throughout his product's value chain.

If he lives up to these standards, I think that even those original shareholders – who are now bitter about not reaping the fruits of the visions and ideals they had some 15



years ago – will probably find some consolation if, at the end of the day, their years of pioneering efforts have not gone totally to waste. It remains painful, realising that well over US\$50 million has been invested (and mostly burned) from 1996, to where the company is today.

Now the burden of proof – and the ultimate responsibility – is only on one man: Jatin Mehta. As I have written before, I know him as a good person and I want to believe that he will not disappoint the market and the industry. And, if, God forbid, he does? We shall never be more than a pen-stroke away. ♦

The Jatin Mehta Connection

Jatin Mehta is founder and Chairman of India's publicly listed **Su-Raj Diamonds and Jewellery Ltd.**, which changed its name to **Winsome Diamonds and Jewellery Ltd.** in the aftermath of the publicity surrounding the (divested) **New York Su-Raj Diamonds** company's involvement in undisclosed synthetic diamond sales. (See: "Exposing the Fraudulent Undisclosed Synthetic Diamond Trail," DIB #710, May 30, 2012.)

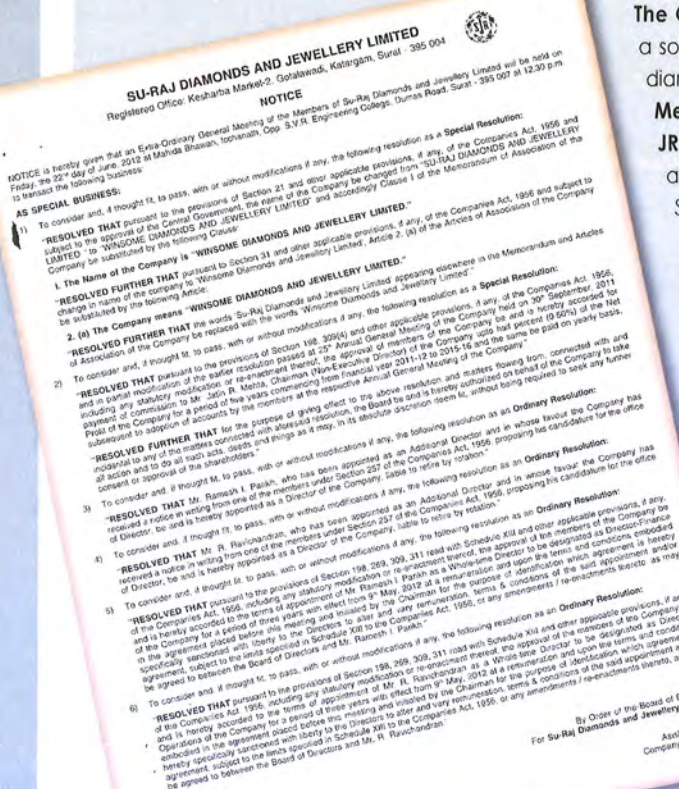
Jatin's Winsome Diamonds boasted a record annual US\$1 billion-plus turnover (for the year ending March 2012). He saw his Indian company grow by 29 percent year to year, producing a (rather low) US\$22 million pretax profit. But Winsome is not connected to Gemesis. The synthetic business represents a long-time personal fascination of Jatin Mehta. Even before his investment in Gemesis, he seemed greatly committed to the development of a gem synthetics market.

After assuming control of Gemesis in 2010, Jatin Mehta moved the company's synthetic production facilities from **Lakewood, Florida**, to **Malaysia**, as there, according the Gemesis CEO **Stephen Lux**, "governmental financial incentives will benefit the company."

In a previous exposé, we also disclosed the establishment of **The Gemesis Company (S) Pte. Ltd.** located in **Singapore**. This is a sophisticated state-of-the-art facility producing synthetic gem diamonds using the CVD method. This Singapore company lists **Jatin Mehta's wife, Sonia**, and an offshore (**Nassau**-based) company, **JRD International Ltd.**, as its only two shareholders. Both **Sonia** and Jatin's son, **Vishal Jatin Mehta**, serve on the board of the Singapore company.

The Singapore Gemesis company was not owned by the same shareholders as the U.S.-based Gemesis company. Though Gemesis CEO Stephen Lux assured us earlier this year that he was in charge of all global Gemesis synthetic diamond sales, there were no indications that he had anything to do with the running of the Singapore company. A quite idiosyncratic structure emerged, as with non-identical shareholdings the different companies faced enormous transfer-pricing challenges to protect the "old" shareholders in the U.S. Gemesis company.

A photograph of the undisclosed synthetic diamonds submitted to the IGI in Antwerp.



A Special Resolution Notice proposing the name change from **Su-Raj Diamonds and Jewellery Limited** to **Winsome Diamonds and Jewellery Limited**.

4 CORNERS OF THE GLOBE

INDIA **GJEPC Elections Foster Leadership Changes in Indian Industry**

India's **Gem and Jewellery Export Promotion Council (GJEPC)** has announced changes in leadership following the organization's biennial elections at the end of September.

Vipul Shah, Chief Executive Officer and Managing Director of **Asian Star Co.**, has been elected to serve as GJEPC Chairman for the forthcoming 2012-2014 term. Among his industry experience, Shah has previously served as Convener of the GJEPC's Banking, Insurance and Taxation committee and has been a member of the Committee of Administration for the past two years. (See box below for more background on Vipul Shah.)

Elected as GJEPC Vice-Chairman is **Pankaj Parekh**, who, in 1997, was the first person to be elected from eastern India in the GJEPC's Central Managing Committee, set up by the Ministry of Commerce. Since then, within the GJEPC, Parekh has held several posts in Central and Regional Committees and is now the Regional Chairman of the Eastern region. (See box, right, for more background on Pankaj Parekh.)

Elected to serve as members of the GJEPC's Diamond Panel Committee for the next two years are **Saunak J Parikh** of **Mahendra Brothers Exports Pvt. Ltd.**, Mumbai, and **Nirav J Bhansali** of **Prism Enterprises Pvt. Ltd.**, Mumbai, who will succeed the committee's newly retired members **Bakul Mehta**, **Vasant Mehta** and **Kanubhai D Shah**.

Additionally, **Ajesh N Mehta** from **Navinchandra Exports Pvt Ltd.** has been elected to the GJEPC's Diamond Reserved category, and **Collin P. Shah** of **Kama Schachter Jewellery Pvt. Ltd.**, Mumbai, has been elected to the Gold Jewellery Panel for the 2012-2014 term, replacing the newly retired **Vijay Kapoor**.

Commenting on the outcome of the elections, outgoing GJEPC Chairman **Rajiv Jain** said, "It is a pleasure to see the selection of four budding young people onto the panel governing the functioning of the GJEPC Committee. It is a good sign for the future of the Council and the industry."

While Jain is no longer the GJEPC Chairman, he remains in the position of Regional Chairman for the Jaipur Region. Other GJEPC Regional Chairmen are: **Anil Sankhwal** for New Delhi, **Princeson Jose** for the South, **Pankaj Parekh** for the East, and **Chandrakant Sanghavi** for Gujarat.



Pankaj Parekh

Pankaj Parekh, GJEPC Vice-Chairman

Pankaj Parekh belongs to a family of jewelers that goes back several generations. While he obtained a bachelor degree in mechanical engineering in 1967, Parekh left engineering for the family jewelry business in 1988. However, instead of venturing into local business, he started his own business of jewelry exports.

Among his leadership experience within the industry, in June 2000, Parekh served as a member of a government delegation to **Israel**, which was led by the then Chief Minister of West Bengal, **Jyoti Basu**, and MP and Chairman of the **West Bengal Industrial Development Corporation Ltd. (WBIDC)**, **Somnath Chatterjee**. During this delegation he initiated the idea of the "**Manikanchan**" **Gem and Jewelry Park** for West Bengal. He was subsequently inducted as a member in the Board of the **Manikanchan Gem and Jewelry Park** by WBIDC in 2001, and has played a key role in the creation of **Manikanchan**, which was inaugurated in November 2003.

Parekh has also led, or been a member of various gem and jewelry industry delegations, organized by the **Council to Countries** e.g. **Italy, Latin America, Bangladesh, Myanmar, Middle-East**, etc., which includes attending of the **BIMSTEC (Bangladesh, India, Myanmar, Sri Lanka & Thailand Economic Co-operation)** meetings in November 2002 in Sri Lanka, and in July 2003 in Mumbai. Additionally, Parekh was a trade nominee in the Board of the **Bureau of Indian Standards' Precious Metals Sectional Committee (BIS MTD 10)** for the hallmarking of precious metal jewelry under the Indian government's Ministry of Consumer Affairs.

Parekh is also the Chairman of the Eastern Region of the **Indo-Italian Chamber of Commerce and Industry**, among other philanthropic activities.

Vipul Shah, GJEPC Chairman

Vipul P Shah, Chief Executive Officer and Managing Director of **Asian Star Co. Ltd.**, is described as "a visionary" with enriched experience in the diamond industry and "undisputed" expertise in financial matters. He is well traveled and has thorough knowledge of current global business trends as well as deep insight of future needs of the diamond market.

Shah's broad strategic vision, business acumen and professional conduct have contributed significantly in transforming a manufacturing company to a value-added, vertically integrated business partner. He has been instrumental in establishing **Asian Star's** jewelry business and global distribution network. Under his dynamic leadership and able guidance, the company has attained the status of being one of India's leading diamondaires.

Shah has been an active spokesperson and an ardent supporter of all activities that promote the Indian diamond industry.



Vipul Shah

4 CORNERS OF THE GLOBE

ZIMBABWE

KP Chair to Address Zimbabwe Diamond Conference 2012

The current Chair of the **Kimberley Process Certification Scheme (KPCS)**, U.S. Ambassador **Gillian Milovanovic**, will be a keynote speaker at the upcoming Zimbabwe Diamond Conference 2012 in **Victoria Falls**. The conference, which is scheduled for November 12-13, aims to enable in-depth discussion of issues specifically related to the African diamond industry.

"I look forward to an opportunity to present to the conference the vision which this

Chairmanship has sought to pursue and to preview for participants the proposals which can be expected to be the focus of the KP Plenary's work 27-30 November in **Washington DC**," Ambassador Milovanovic writes in a letter to Zimbabwe Mines Minister **Obert Mpofu**.

"It is time to close the ranks and to look at the bright future and prosperity diamonds will bring to the African continent," states Minister Mpofu in his welcoming of Ambassador Milovanovic to the international diamond conference.

Conference Speakers, Attendees

Among the Conference's speakers are: **World Diamond Council** President **Eli Izhakoff**; **World Federation of Diamond Bourses** President-Elect **Ernie Blom**; **Dubai Multi Commodities Centre** Authority Executive Chairman **Ahmed Bin Sulayem**; **Dubai Diamond Exchange** Chairman **Peter Meeus**; **Diamond Dealers Club of New York** President **Reuven Kaufman**; **Antwerp World Diamond Centre** President **Stephane Fischler**; **Shanghai Diamond Exchange** President **Lin Qiang**; and a former Chairman of the **Gem and Jewellery Export Promotion Council**, **Vasant Mehta**.

The following African ministers of mines will also be attending the Conference: **Martin Kabwelulu Labilo**, Minister of Mining of the Democratic Republic of Congo; **Susan Shabangu**, Minister of Mineral Resources of the Republic of South Africa; and **Isak Katali**, Minister of Mines and Energy of the Republic of Namibia.

"With the attendance of so many key officials, both from the producing countries and from the industry, the Zimbabwe conference will enable us to examine together how to optimize the role of diamond resources in the economic development of the region," says WDC President Eli Izhakoff. "And how appropriate is it that we will do that in one of Africa's true gems, Victoria Falls, one of the seven natural wonders of the world."



Gillian Milovanovic

TANZANIA

Small-Scale Miners, Dealers Appeal to Govt. for Gems, Minerals Business Center

In an effort to promote trade in the country's gemstones and industrial minerals, the government of **Tanzania** has been asked to spend half of its allocated budget for small-scale miners this financial year to construct a miners' business center that will be used for both local and international gemstone and mineral shows, reports the *Tanzania Daily News*.

Speaking at the recent annual meeting of **Eastern Zone of Tanzania Small Gemstone Dealers Organisation (TASGEDO)** in **Dar es Salaam**, TASGEDO Chairman **Paulo Mbwambo** said the proposed building should have

a conference hall that can be used to hold trade shows showcasing Tanzanite, sapphires, ruby, **diamonds** and industrial minerals such as copper, iron, nickel and uranium.

"All Tanzanians with gemstone or industrial minerals would be able to bring to the show for foreigners to purchase easily and consequently enable the government to increase its revenue," Mbwambo told the news source.

At the meeting, Mbwambo also reportedly addressed the recent announcement by the **Ministry for Energy and Minerals** regarding the increase in license fees for gemstone and minerals miners, dealers and exporters, despite the fact that even the previous license fees were beyond the reach of some dealers and miners. According to the TASGEDO chairman, the idea had been raised and implemented without consulting the small-scale miners and gemstone and minerals dealers. He therefore publicly called for the ministry to arrange a joint meeting with the country's minerals stakeholders so as to get their views on the new fees with the express hope of reducing them, reports the *Tanzania Daily News*.

BOTSWANA

Botswana Diamond Exports down 82% in August

Botswana's diamond exports for August 2012, which include both rough and polished, totaled US\$95.9 million, signifying a year-over-year decrease of 82 percent in value, according to the **Bank of Botswana's** data. Compared to July exports, Botswana saw a 63.2 percent decline in value last month.

For the first eight months of the year, Botswana's exports totaled US\$2.37 billion, down 36 percent from the January to August period of 2011.

In 2011 Botswana exported almost US\$5 billion worth of diamonds, an increase of 56 percent in value compared to 2010, whose exports totaled US\$3.2 billion, the bank data shows.

The bank's figures are sourced from the **Diamond Trading Company Botswana**, **Teemane Manufacturing Co.**, **Leo Schachter Botswana**, **Statistics Botswana**, among other exporters.

4 CORNERS OF THE GLOBE

BELGIUM

Belgium's Polished Trade Declines in September

Belgium's polished diamond exports during September fell 19 percent by value to US\$1.3 billion and 16 percent by volume to 617,783 carats as compared to September 2011, according to data released by the **Antwerp World Diamond Centre** (AWDC). Polished imports for the month also declined 23 percent by value to US\$1.2 billion and 22 percent by volume to 612,253 carats year over year.

Meanwhile, September rough diamond exports and imports experienced increases. Belgium exported 9.8 million carats of rough diamonds worth \$1.1 billion during September, an 8 percent rise in value and a 68 percent rise in volume year over year. Rough imports for the month totaled 7.4 million carats worth US\$1.1 billion, a 5 percent rise in value and a 2 percent rise in volume as compared to September 2011.

During the January to September 2012 period, Belgium's polished diamond exports declined 21 percent by volume and 10 percent by value as compared to the same period in 2011. Some 5.2 million polished carats worth US\$10 billion were exported in total.

Polished imports during this nine-month period also showed year-over-year declines in volume and value of 18 percent and 5 percent, respectively. Some 5.8 million carats of polished diamonds worth US\$10 billion were imported in total.

Belgium exported 75.2 million carats of rough diamonds worth US\$9.8 billion during the same period, declines in volume of 12 percent, and in value of 13 percent, year over year. Rough imports during January to September also fell by double digits. Some 64 million carats of rough totaling US\$9 billion were imported, signifying a 20 percent decline in volume and a 15 percent decline in value as compared to the same period in 2011.

Belgium's Polished Diamonds						
	Jan-Sept 2012		Jan-Sept 2011		Change %	
	Carats	US\$	Carats	US\$	Carats	US\$
Exports	5,248,858	10,003,298,546	6,651,768	11,071,548,744	-21.09	-9.65
Imports	5,760,414	10,025,331,889	7,051,123	10,585,878,486	-18.31	-5.30

	Sept 2012		Sept 2011		Change %	
	Carats	US\$	Carats	US\$	Carats	US\$
Exports	617,783	1,331,401,437	731,221	1,641,162,531	-15.51	-18.87
Imports	612,253	1,179,220,061	780,161	1,530,831,849	-21.52	-22.97

Belgium's Rough Diamonds						
	Jan-Sept 2012		Jan-Sept 2011		Change %	
	Carats	US\$	Carats	US\$	Carats	US\$
Exports	75,153,352	9,836,074,322	85,810,909	11,314,190,324	-12.42	-13.06
Imports	64,017,915	9,060,296,173	79,870,714	10,710,117,965	-19.85	-15.40

	Sept 2012		Sept 2011		Change %	
	Carats	US\$	Carats	US\$	Carats	US\$
Exports	9,771,298	1,146,779,481	5,829,822	1,059,878,566	67.61	8.20
Imports	7,439,607	1,074,424,048	7,287,468	1,027,493,136	2.09	4.57

Belgium's Polished Diamond Exports by Country								
	Jan-Sept 2012		Change 2011		Sept 2012		Change %	
	Carats	US\$	Carats	US\$	Carats	US\$	Carats	US\$
U.S.	888,372	2,676,036,140	6.31	-9.41	69,900	247,251,017	0.40	-27.96
Hong Kong	1,222,877	2,525,901,149	-7.75	-2.63	265,467	649,565,906	7.78	-6.83
Israel	386,913	960,382,452	-20.23	-19.87	22,962	67,400,755	-46.94	-29.72
Switzerland	485,771	951,373,258	-22.57	1.38	39,302	61,566,010	-51.14	-54.57
UAE	467,196	550,788,213	-24.99	1.55	40,062	61,807,537	2.86	26.40
India	495,758	382,648,550	-59.66	-55.95	46,134	37,972,349	-49.44	-38.86
China	234,546	351,848,819	4.52	5.48	21,170	41,299,801	-32.96	-7.94
France	131,835	285,078,054	-13.95	8.08	15,222	33,088,029	-7.69	-31.19
UK	46,838	204,384,456	-12.42	-19.80	6,431	15,705,432	1.35	-37.65
Italy	222,566	189,748,012	-21.75	-6.28	26,745	25,254,990	9.85	3.26
Others	666,185	925,109,443			64,388	90,489,608		
Total	5,248,858	10,003,298,546			617,783	1,331,401,437		

Source: Diamond Office at Antwerp World Diamond Centre (AWDC)

Firestone Diamonds Sees Improved Quality, Value of Liqhobong Diamonds

Firestone Diamonds plc reports that "good progress" was made in improving the quality and value of diamonds recovered from its **Liqhobong** mine in **Lesotho** following the planned shutdown of the mine's pilot plant in July 2012.

The mine's pilot plant was shut down for 14 shifts in July to be fitted with equipment necessary to reduce diamond breakage of the larger stones. According to Firestone Diamonds, while the retrofitting was successful, returning the plant to a steady state of production took longer than anticipated due to technical challenges as well as extremely cold weather and heavy snowfalls in Lesotho in August.

As a result, the plant only returned to steady state conditions during mid-September. However, since mid-September, Firestone notes that it has seen a marked increase in the recovery of higher quality white and undamaged stones and the higher run rate has continued into early October.

Higher Value Stones

Amongst the largest stones recovered in August and September were three yellow stones weighing 27, 17 and 15 carats and three white stones weighing 12.4, 9.2 and 9.1 carats.

"The change in the amount of whiter stones recovered is also encouraging which should continue on an upward trend as the mine plan calls for more of the higher grade, larger stone bearing areas of the pit to be mined during the remainder of the year," says **Tim Wilkes**, Chief Executive Officer of Firestone Diamonds.

The feed for the pilot plant is expected to improve in grade and quality over the coming weeks as more of the K5 higher grade rock that historically carries the bigger stones will be exposed in the open pit.



Liqhobong Plant

Namdeb Operations



Namdeb, MUN Reach Two-Year Wage Deal

The management at **Namdeb** and the **Mineworkers Union of Namibia** (MUN) have successfully concluded wage negotiations, which have resulted in a two-year agreement for the period of 2012/2013 and 2013/2014. The deal follows an earlier salary dispute that began this past spring and that hit an impasse when, in August, Namdeb management requested an unresolved dispute certificate.

As part of concluding the two-year wage settlement, the company, a mining joint venture between **De Beers** and the government of Namibia, and MUN have committed to safety, productivity improvements and continued relationship-building.

According to a Namdeb statement, the agreement, which is effective retroactively from April 1, 2012, provides for a sliding-scale increase in wages for employees in the bargaining unit as well as increases in a number of allowances. The increases in the 2012/2013 basic wages range between 8.5 percent and 10 percent depending on the grade of the employee, while the increase to 2013/2014 wages is 7.5 percent across the board.

The mediation panel that brokered the agreement comprised Regional Councillor **Eliphas Iita**; Oranjemund Mayor **Henry Coetzee**; SWAPO party Regional District Coordinator **Silas Shituvula**; Oranjemund Town Council Management Committee Chairman **Toivo Auala**; and Deputy Mayor **Xungileni Ntinda**.

"...there is joy in our community that we have been able to settle this matter. We do not want instability in Oranjemund the newest town in Namibia. We want to see Namdeb growing to the benefit of all its stakeholders," said the Mayor of Oranjemund, Henry Coetzee, at the agreement's signing.

A year ago, Namdeb and MUN found themselves in conflict over housing and utility allowances, drawing the intervention of Namibia's State House to break a deadlock that caused a month-long strike, reportedly costing De Beers US\$16 million in profits. At the end of that strike, both parties vowed to work together to restore trust and rebuild their relationship.

DIGGING THE D.B.T.

Drilling at Petra's Cullinan Mine in SA



Miners at Petra Diamonds' SA Operations Return to Work after 4-Day Strike

An estimated 600 employees at **Petra Diamonds** ended a strike Saturday that began early last week at the miner's operations in **South Africa**, **Reuters** reports, citing a union spokesman. The sit-in strike over working conditions and wages started on October 2, and was similar to several of its kind that hit South Africa's mining sector within the past weeks.

"The Petra Diamond strike has ended. There was no deal. They just agreed to return to work," **Lesiba Seshoka**, spokesman for the **National Union of Mineworkers**, told the news source. The workforce reportedly returned to posts late Friday.

Petra Diamonds, which has interests in operating mines in **South Africa** and **Tanzania**, doubled production to 2.2 million carats in fiscal 2012. Group production is expected to increase approximately 30 percent to 2.85 million carats in fiscal 2013.

Argyle's Underground Block-Cave Project



Mountain Province Diamonds Files \$47 Million Rights Offering

Mountain Province Diamonds Inc. has filed a rights offering circular with the **Toronto Stock Exchange (TSX)** and the securities regulators in each of the provinces of **Canada** (with the exception of **Quebec**), regarding a rights offering to raise gross proceeds of approximately C\$47.1 million. These proceeds will be used to fund the company's 49 percent share of the initial capital costs for the **Gahcho Kué** diamond mine in Canada's **Northwest Territories**, a joint venture with **De Beers Canada Inc.** (who owns the remaining 51 percent interest), and for general corporate purposes.

According to the miner, proceeds from the rights offering are expected to be sufficient to cover Mountain Province's share of the initial capital costs through to the completion of permitting of Gahcho Kué in 2013.

Under the rights offering, each registered holder of Mountain Province common shares, as of a record date to be determined in conjunction with the TSX, will receive one right for each share held. Notes Mountain Province: "Six rights plus the sum of C\$3.50 are required to subscribe for one share. The rights will expire on a date to be announced, after which unexercised rights will be void and without value. The rights will be listed on the TSX. Shareholders who fully exercise their rights may subscribe pro-rata for any additional shares not otherwise subscribed for before the expiry date," further explains the company.

"We have received wide support for a broad placement of common shares. However, given that the Company's shares are currently trading below the C\$5 level of the last placement completed in October 2010, the Board considers a rights offering to be fairer and in the best interest of current shareholders," says **Patrick Evans**, Mountain Province President and CEO.

The rights offering is subject to regulatory approval, including that of the TSX.

Argyle Mine to Receive World's Largest Underground Mine Automation System

Rio Tinto has ordered underground mining automation system for its wholly owned **Argyle** diamond mine in an effort to accelerate its underground operation efficiency. The advanced **AutoMine** automation system, scheduled for delivery in 2012-2013, will also enhance the mine's safety and achieve production improvements, according to **Swedish** mine automation technologies provider **Sandvik Mining**.

Included in the AutoMine system order for the Argyle mine are 11 electric loaders and two diesel loaders, which will be operated from three stations in a Sandvik surface control room. The system delivery also reportedly includes Sandvik's recently launched Draw Control product that enables accurate tracking, reporting and overall management of manual production loading during the mine's development phase.

According to Sandvik, the Argyle production structure is fully designed for automation when fully operational, and the mine's AutoMine automation systems will be the largest underground mining automation installation in the world to date.

BRIEFLY NOTED

Industry Leaders to Gather in Mumbai for 35th World Diamond Congress

Key players in the diamond industry from the **World Federation of Diamond Bourses** (WFDB) and the **International Diamond Manufacturing Association** (IDMA) are gathering in **Mumbai** next week for the **35th World Diamond Congress**, which aims to create a platform for key players to interact with one another and plan the industry's road ahead. Also attending the Congress, scheduled for October 14-17, will be ministerial heads from countries associated with the diamond industry.

The Congress's agenda includes the election of the new WFDB president, as well as the executive and key positions associated with the organization. International, high-ranking industry and governmental speakers will also be addressing attendees, including the South African Minister of Minerals and Mines, **Susan Shabangu**, who will serve as a keynote speaker.

During the Congress, the strategy and implementation of a new development for the WFDB, the **World Diamond Mark**, will also be presented to members. According to the WFDB, this development will bring with it major changes in how the organization interfaces with retail outlets across the world. This new financial model and marketing development puts diamond marketing in the hands of the WFDB, which has developed this product as an all-inclusive diamond strategy to ensure that diamonds secure their place in the luxury goods market.

Congress participants are also scheduled to visit diamond-based factories, including in Surat. A list with all speakers who will be addressing delegates is available on the WDC's official website, at <http://www.diamondcongress2012.com/WDC/index.aspx>, as is information on the event's schedule and program, participating organizations, the hosts, the sponsors, information about registration, the venue hotel and room booking, social tours and post-congress optional programs.

Additionally, in preparation for the Congress, IDMA has launched a new Facebook page to which the IDMA communications team will post as many Congress updates, discussions, presentations and visuals as possible. The IDMA Facebook page can be found at: <http://www.facebook.com/>

Rio Tinto to Exhibit Argyle Pink Diamonds at Kensington Palace

More than US\$60 million worth of jewelry featuring diamonds from **Rio Tinto's Argyle** diamond mine will be showcased in an exhibition at **Kensington Palace** titled "Out of the Vault: Pink Diamonds and Royalty."

The 40 rare and valuable items of pink diamond jewelry on display in London are sourced from luxury jewelers and designers from the **U.S., Australia, Japan, China, India and Europe**.

According to Rio Tinto Diamonds, the inspiration for this pink diamond jewelry exhibition came from Her Majesty the Queen's Diamond Jubilee. In the year of her coronation, the Queen had a solitaire pink diamond (The Williamson Pink) gifted to her and set in the center of a flower spray brooch created by **Cartier**.

"We therefore consider it fitting in this Jubilee year, for Argyle Pink Diamonds to celebrate the special relationship that rare pink diamonds have played, and continue to play, in royal occasions," says **Josephine Johnson**, Manager of Argyle Pink Diamonds.



RJC Board Names Successor to RJC Chairman Matt Runci

The Responsible Jewellery Council (RJC) has announced that **James Courage**, Chief Executive Officer of Platinum Guild International (PGI), will succeed **Dr. Matt Runci** as RJC Chairman. Courage will assume the position of RJC Chairman-elect upon Matt Runci's retirement on December 31, 2012. Runci served as RJC Chairman for almost eight years.

Courage, whose appointment was unanimously endorsed by the RJC Board, has more than 30 years of extensive experience in the jewelry industry, with De Beers in the 1980s and from 1996 with the Platinum Guild; he has worked and lived in Europe, Africa and Asia.

Commenting on his appointment, Courage says: "I am fortunate to be assuming the chairman's role of an organisation exhibiting exceptional institutional health... In assuming the role as the non-executive Chairman, I look forward to assisting RJC's Members, its Board and its Management Team build on the successes of Matt's term, so as to achieve the RJC's mission: To advance responsible ethical, social and environmental practices, which respect human rights, throughout the diamond, gold and platinum group metals jewellery supply chain, from mine to retail," concludes Courage.

Courage will be formally confirmed as Chairman by the full RJC membership at the RJC's Annual General Meeting in May next year.

OFF THE SHELF

Christie's New York Sale to Feature Diamonds Larger than 50 Carats

Christie's New York is holding its first jewelry auction of the fall season on October 16, where a total of 372 lots will be offered and expected to achieve in excess of US\$35 million. Highlighting the two-session **Magnificent Jewels** sale at Christie's **Rockefeller Center** saleroom will be a trio of diamond jewels weighing more than 50 carats each, as well as a rare double strand of large natural pearls.

Top Diamonds

The New York sale's top lot is a pair of diamond ear pendants, with a pear-shaped fancy yellow diamond of 52.78 carats and a pear-shaped white diamond of 50.31 carats mounted in yellow and white gold and surmounted by circular-cut fancy yellow and white diamonds. Their pre-sale estimate is US\$4.5-6.5 million.



A pair of diamond ear pendants of 52.78 and 50.31 carats on offer at Christie's New York

Other highlights include a pear-shaped D-color flawless diamond of 50.52 carats mounted in platinum (whose pre-sale estimate is available from Christie's upon request); and an oval-cut fancy intense yellow, internally flawless diamond of 68.35 carats with a pre-sale estimate of US\$2.2-3.2 million.

Other Highlights

The auction will also include a rare double-strand natural pearl necklace formed of 120 large-sized individual pearls and more than 130 signed jewels by **Buccellati, Bulgari, Cartier, Graff, Marina B., Oscar Heyman & Brothers, Tiffany & Co.,**

Van Cleef & Arpels, David Webb, Harry Winston and Raymond Yard, among others.

Christie's is also offering a selection of jewels by **Marina B.**, granddaughter of **Sotirio Bulgari**, and, as a special fundraising item within the sale, a pair of pearl and diamond ear clips by the **Indian** designer **Viren Bhagat**.

Cartier, Tiffany Ranked among Top Global Luxury Brands

Cartier and **Tiffany & Co.** are the top jewelry names on the "Best Global Brands" list from international branding consultancy **Interbrand**, which publishes the report of the world's 100 most valuable brands on an annual basis.

Cartier ranked 68th, up from last year's 70th place ranking, while Tiffany ranked just behind it at 70th, also up from last year's 73rd place ranking, reports **JCK Online**. The other luxury names on the list include **Louis Vuitton** (#17), **Gucci** (#38), **Hermès** (#63), **Burberry** (#82), and **Prada** (#84).

"Despite the current economic landscape, all of the luxury brands in this year's report increased their brand value. As the meaning of luxury shifts, this year's top luxury brands reflect a changing global consciousness – with success dependent not only upon a portfolio of superior products and superb quality of service, but also a strong cohesive brand, a formidable digital presence, and reputation that is timeless, elevated, and refined," says a company statement.

To develop its report, Interbrand says it examines financial performance of the branded products or service, the role the brand plays in influencing consumer choice, and the strength the brand has to command a premium price, or secure earnings for the company.

Coca-Cola held the list's "number one" spot, followed by **Apple, IBM, Google,** and **Microsoft**.



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DIAMONDS

The New Lab-Grown Diamond Company That Doesn't Seem All That New



Rob Bates | April 3, 2013 | CUTTING REMARKS



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Last week, I received a release from [Ila Technologies](#), which at first glance appeared to be a new company based out of Singapore that produces lab-grown diamonds. The release included some pretty impressive boasts. It uses a new process: Microwave Plasma Chemical Vapor Deposition! It can produce to specifications! It is the world's biggest diamond grower!

But what got me a little more interested in this company is its seeming connection to Gemesis Corp., even though it never acknowledges or references Gemesis in its company [history](#).

Certainly, the connections appear to be there. Ila Technology's [board](#) includes Vishal and Sonia Mehta, both of whom [were involved in Gemesis](#). There's a [LinkedIn profile](#) that calls Gemesis "the former name" of Ila. It is also based in Singapore, where Gemesis has an office, according to a [speech](#) by the country's prime minister (who calls Gemesis an "Indian company"). And finally, look at that [Ila logo](#). The exact same insignia can be seen on the [Gemesis site](#).

I'd like to have you think finding those links was the result of hard-core investigative reporting, but really, it took about 20 minutes tops. Even though Ila's press release repeatedly talks about gem diamonds, it does seem a little more oriented toward producing diamonds for industrial uses than Gemesis. And the two companies do have different PR firms—neither of which have answered my queries about any connection between Gemesis and Ila. In fact, Ila sent me a release, and then told me to send some queries. I did, and then the PR people told me they wouldn't answer any questions about the company. Gemesis told me last week it would get back to me but hasn't as of yet. (UPDATE: Gemesis has now declined comment, saying it is a private company, albeit one that may have two PR firms.)

I have no idea what this means for Gemesis, which is still [doing business under that name](#). But we have talked [about problems in the lab-grown sector](#), and here is another one worth discussing. Many years ago, someone involved in the "created" business told me a wise thing. He said, it's in the companies' interests to make the industry comfortable with the product, because people only buy products they are comfortable with.

And yet, with synthetic diamonds, it hasn't really worked out that way. We are continually told, particularly by the media, that they will "destroy" the rest of the industry. They are generally sold with some reference to conflict diamonds, which makes the rest of a jeweler's inventory look suspect. And of course, when a company is mysterious and won't answer basic questions, that doesn't help. Nor does it help when a [package of undisclosed synthetic diamonds](#) shows up in Belgium.

For the last several months, Gemesis has proven a lot more interesting for its [behind-the-scenes machinations](#) than for its diamonds. Perhaps this new company is an attempt to have a fresh start. But it doesn't look like the people involved have learned much from the past.

Friday, June 3 - Monday, June 6, 2016

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About This Contributor:

Rob Bates

Rob Bates is news director of JCK. He has won numerous editorial awards, including two prestigious Neal Awards for his blog in 2007 and 2011, five Eddies from Folio magazine, and the American Gem Society's Triple Zero Award for industry service. He has been interviewed by CNN, NPR, The New York Times, The Wall Street Journal, and numerous

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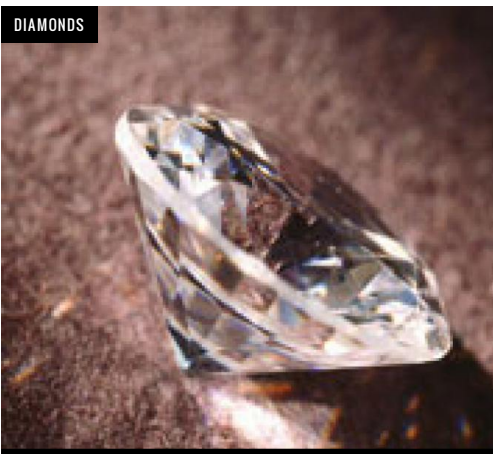
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TECHNICAL NOTE

Title: Characterisation of an optical grade single crystal synthetic diamond sample (NL625-03) supplied by Microwave Enterprises

Authors: Philip Martineau and Brad Cann

Date: 5 October 2016

1. Summary

This report describes the results of characterisation of an optical grade single crystal synthetic diamond plate provided by Microwave Enterprises to Andrey Jarmola of the University of California at Berkeley. The quotation provided by Microwave Enterprises indicates that the sample was produced by Ila Technologies Pte Ltd. The sample was sent to De Beers Technologies UK for analysis and was assigned internal reference number NL625-03. It had the following dimensions: 3.04 mm x 3.26 mm x 0.73 mm.

This optical grade plate, produced by Ila Technologies (previously known as Gemesis) and sold by Microwave Enterprises, has optical absorption and luminescence characteristics of nitrogen-doped single crystal CVD synthetic diamond material that has not been annealed to high temperatures after growth. As all material produced by Ila Technologies that we had previously studied had been annealed to high temperature after growth, this study was an interesting opportunity to develop a better understanding of the characteristics of as-grown single crystal CVD synthetic diamond produced by Ila Technologies.

DiamondView images of NL625-03 were dominated by orange fluorescence that is typical of as-grown CVD synthetic diamond grown from gases containing nitrogen. They also showed striations that are a strong indicator of CVD synthetic diamond and are caused by different uptake of defects on the risers and terraces of steps that form during growth.


Electron Paramagnetic Resonance (EPR) measurements carried out at the University of Warwick indicated that the concentration of neutral single substitutional nitrogen in NL625-03 was 118(10) ppb ($2.07 \times 10^{16} \text{ cm}^{-3}$).

Laser calorimetry measurements of the absorption coefficient of the sample at 1064 nm were made at Laser Zentrum Hannover. The absorption coefficient at 1064 nm was found to be $0.057(6) \text{ cm}^{-1}$.

Analysis of Metripol images recorded at Warwick University indicates that NL625-03 shows only first order birefringence. Over the selected 1.3 mm x 1.3 mm area the maximum value of $\sin \delta$ and $|\sin \delta|$ was found to be 0.548(20) for NL625-03. Over the selected 2.5 mm x 2.5 mm area the maximum value of $\sin \delta$ and $|\sin \delta|$ was found to be 0.834(20) for NL625-03. For the 1.3 mm x 1.3 mm area, the maximum Δn value was $7.46(50) \times 10^{-5}$. For the 2.5 mm x 2.5 mm area the maximum Δn was $1.27(5) \times 10^{-4}$.

2. Introduction

The sample was received by De Beers Technologies UK on 17 June 2014. It was assigned internal reference number NL625-03. It had been bought from Microwave Enterprises by Andrey Jarmola of the University of California at Berkeley. Figure 1 shows a quote (dated 24 February 2014) that he had received stating that the samples offered were produced by Ila Technologies Pte Ltd.

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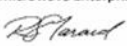
Quote
Date: 02/24/14
MWE Quote #: 13-2051
Ila Quote #: 1314-121

Prepared For:
Andrey Jarmola
Department of Physics
University of California
366 LeConte Hall #7300
Berkeley, CA 94720-7300

Description:
The following quotation is for Lab Grown, CVD single crystal diamond plates, produced by Ila Technologies Pte LTD. Products listed are optical grade, single crystal diamond with orientation and size as noted below and small quantity orders.

S/N	DESCRIPTION	ITEM CODE	Quantity	UNIT PRICE (USD)
1	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Optical Grade)	2PCVD3030004N	20	\$101.00
2	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Electronic Grade)	2PCVDEG3030004	20	\$490.00
3	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Electronic Grade)	2PCVDEG5050004	20	\$1,645.00
Subtotal:				
Bank/Freight/Ins Charges				
GST @0%				
TOTAL				

Terms and Conditions
Payment Terms: In Advance
Delivery Date: 8-10 weeks
Trade Term: Ex Work (MWE)
Validity: Quote is Valid for 30 days from date of issue


For Microwave Enterprises, Ltd.

Richard S. Garard, CEO

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Figure 1: Scanned copy of the quote sent to Andrey Jarmola for “Lab Grown CVD single crystal diamond plates, produced by Ila Technologies Pte Ltd”.

Andrey Jarmola purchased 20 of the optical grade lab grown CVD single crystal diamond plates with the item code 2PCVD3030004N. Figure 2 is a scanned copy of the packing slip (dated 9 June 2014) for the 20 samples sent to him by Microwave Enterprises.

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Bill To:
Attn: Andrey Jarmola
Company Name: UC Berkeley
Address: 2195 Hearst Ave
City, ST Zip: Berkeley, CA 94720

Packing Slip
Date: 9-Jun-14
Invoice #: 3086
Customer PO #: 8B00361673

Ship To:
Attn: Andrey Jarmola
Company Name: UC Berkeley
Address: LeConte Hall RM151
City, ST Zip: Berkeley, CA 94720

SHIP DATE	SHIP VIA	F.O.B	TERMS
6/9/2014	FEDEX	Morrisville, NC	In Advance

QUANTITY	UNIT	DESCRIPTION	ITEM CODE
20	EACH	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Optical Grade)	2PCVD303004N
		(Total Carat Weight 2.12)	

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Figure 2: Scanned copy of the packing slip for 20 samples sent by Microwave Enterprises to Andrey Jarmola at UC Berkeley. Of these samples 10 were then sent to De Beers Technologies UK.

The description on the quote (Figure 1) and packing slip (figure 2) indicates sample dimensions of 3.0 mm x 3.0 mm x 0.4 mm, but NL625-03 was found to have dimensions significantly different from this (see Table 1). Given that the density of diamond is 3.51 g/cm³, 20 samples with the dimensions stated on the packing slip would have a significantly lower total weight than the 2.12 ct that is also stated on the packing slip and on the sample box (see Figure 3). The expected total weight would be 0.3 x 0.3 x 0.04 x 3.51 x 20 = 0.253 g which is 0.253/0.2 = 1.26 ct.

Sample	x (mm)	y (mm)	Thickness (mm)	Weight/ct
NL625-03	3.04	3.26	0.73	0.13

Table 1: The measured dimensions and weight of the NL625-03 sample received by De Beers Technologies UK.

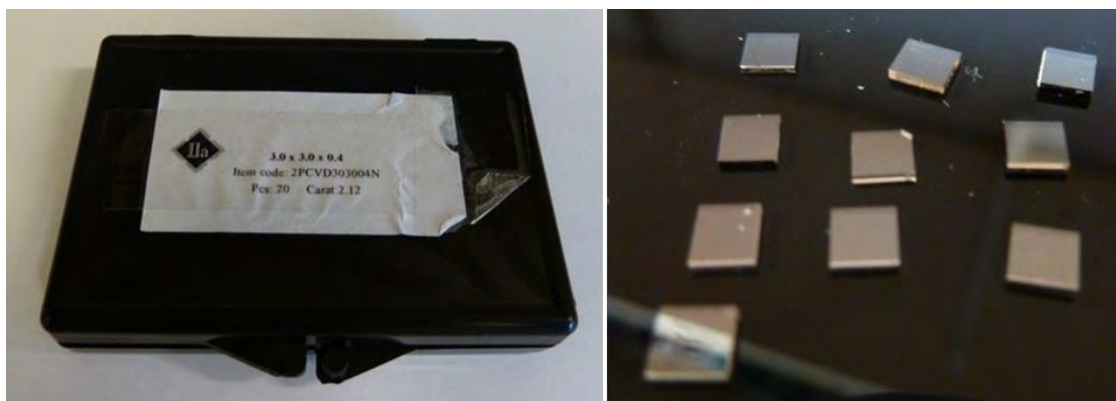


Figure 3: Image of the sample box and 10 of the samples with item code 2PCVD303004N

3. Laue X-ray Diffraction

Laue X-ray diffraction indicated that NL625-03 had $\{100\}$ main faces and $\{110\}$ edge faces, as stated in the quote and on the packing slip.

4. Crossed Polariser Images

Crossed polariser images of the sample were recorded using a Wild M420 microscope. One of the images for NL625-03 is shown in figure 4 for crossed polarisers with polarisations parallel to the edges of the sample. NL625-03 shows stronger birefringence close to two of its edges but no colour was seen in the images and this is consistent with birefringence being limited to first order (ie $\delta < \pi/2$ radians).

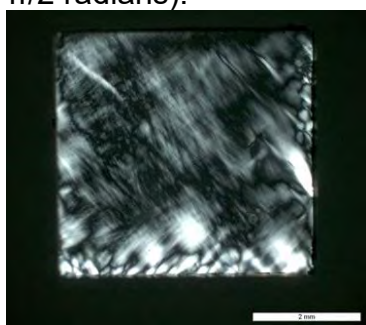


Figure 4: Crossed polariser image of NL625-03 recorded with the polarisation direction for the two polarisers perpendicular to each other and parallel to the edges of the sample

5. DiamondView and Photoluminescence Spectroscopy

The sample was illuminated with shortwave UV radiation in a DiamondViewTM instrument and images of the resulting surface luminescence were captured (see for example, Figure 5). No phosphorescence was observed. The dominant colour of the luminescence was orange and striations (lines of different fluorescence

intensity) were observed. Such striations are a characteristic of CVD synthetic diamond and result from different uptake of defects on the risers and terraces of steps that form of the surface of the synthetic diamond sample during the growth process. Photoluminescence spectroscopy (carried out with 514 nm excitation at 77 K) confirmed that nitrogen vacancy defects with zero phonon lines at 575 nm and 637 nm were present in the sample. The Raman normalised intensities for the lines at 575 nm and 637 nm were found to be 6.9 and 4.5 respectively. Nitrogen vacancy defects tend to be grown into CVD synthetic diamond when nitrogen is present in the growth environment and, as a result, DiamondView images of as-grown samples tend to be orange in colour. When CVD synthetic diamond samples are annealed (heat treated) at high temperatures the nitrogen vacancy defects are dissociated and H3 defects (composed of two nitrogen atoms and a neighbouring vacancy) tend to form. As H3 defects show green luminescence, the dominant luminescence colour changes from orange to green when samples are annealed. The DiamondView images therefore provided evidence that the sample is a CVD synthetic diamond sample but has not been annealed at high temperatures.

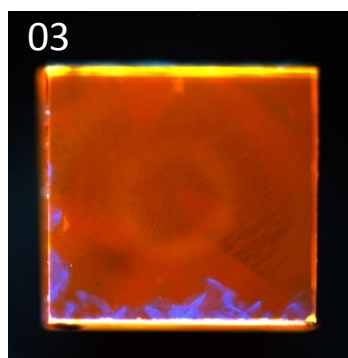


Figure 5: DiamondView surface luminescence image of NL625-03

The DiamondView image of NL625-03 shows blue dislocation-related luminescence near the two sample edges where the stronger birefringence is observed

6. UV/visible Absorption Spectroscopy

A UV/visible absorption spectrum was recorded for NL625-03. It showed a significant peak at 270 nm indicating the presence of neutral single nitrogen defects. By fitting this region of the spectrum using the absorption spectrum of a type Ib natural diamond sample with a known concentration of neutral single substitutional nitrogen, a value for the concentration of neutral single substitutional nitrogen concentration (N_s^0) was deduced as specified in Table 2. The presence of additional components in the absorption spectrum, including a gradual rise in absorption towards shorter wavelengths, was additional evidence that the samples had not been annealed to high temperatures. Such post-growth treatment is designed to remove such absorption and thereby reduce any brown colour.

Sample	N_s^0 concentration from (ppb)
NL625-03	270

Table 2: N_s^0 concentration deduced from the UV/visible absorption spectra

7. Electron Paramagnetic Resonance

Electron paramagnetic resonance (EPR) was used to measure the concentration of neutral single substitutional nitrogen within the samples from the strength of the P1 EPR lines. This work was carried out at Warwick University, and the results are given in Table 3.

Sample	N _s ⁰ concentration from rapid scan EPR
NL625-03	118(10) ppb (2.07 x 10 ¹⁶ cm ⁻³).

Table 3: N_s⁰ concentrations from rapid scan EPR

The EPR result for a given sample indicates the concentration of the N_s⁰ defect measured over the entire sample. The UV/visible spectroscopy result only indicates the concentration in the region defined by the aperture through which the absorption spectrometer beam passes. This difference may account for differences between the results for the N_s⁰ concentration measured using UV/visible absorption spectroscopy and EPR.

8. Near-Infrared Absorption

NL625-03 was sent to Laser Zentrum Hannover for laser calorimetry measurements of absorbance at 1064 nm. The method used and the results are given in the LZH report number 14650 dated 23 October 2015. The method followed ISO 11551 and gave an absorbance result for the NL625-03 plate of 4185 ppm (4185 x 10⁻⁶). From this result and the thickness of the plate (0.73 mm) an absorption coefficient at 1064 nm of 0.057(6) cm⁻¹ was deduced (see Table 4).

Sample	Thickness (mm)	Absorbance	Absorption coefficient (cm ⁻¹)
NL625-03	0.73	4.185 x 10 ⁻³	0.057(6)

Table 4: NIR absorption coefficient results for NL625-03

9. Fourier Transform Infrared (FTIR) Spectroscopy

An FTIR spectrum of NL625-03 was measured at a resolution of 0.5 cm⁻¹. It was found to contain very little absorption apart from the intrinsic absorption of diamond but from the measured absorption coefficient of a weak line at 1332 cm⁻¹ it could be deduced that the upper limited of the N_s⁺ concentration was 0.2 ppm. The concentration of neutral single substitutional nitrogen was low enough for no peak to be observed at 1344 cm⁻¹. This is consistent with the relatively low neutral single substitutional nitrogen concentration (0.118 ppm) measured using EPR.

A weak feature at 3123 cm⁻¹ with a peak absorption coefficient of 0.02 cm⁻¹ indicated the presence of the NVH⁰ defect with an approximate concentration in the region of 20-30 ppb. This defect is found in many nitrogen-containing as-grown

single crystal CVD diamond samples and its presence indicates that the sample had not been annealed above 1800°C, the temperature at which this defect is found to be removed.

10. Metripol Birefringence Measurements

The parallel-sided plate NL625-03 was imaged using a Metripol microscope at Warwick University using an illumination wavelength of 590 nm to give $\sin \delta$ values pixel-by-pixel. Nine overlapping images of the sample were collected using a 4x objective, which provides a 1360 x 1024 pixel image covering 1.581 x 1.191 mm area (approximate pixel size of 1.163 x 1.163 μm). For each sample the overlapping images were then stitched together to create an image of the entire area of each sample. The image stitching was completed using the free program 'ImageJ' with the 'stitching' plugin. This program allows the user to manually place individual image frames into position. The frame positions can then be computationally optimised and a stitched image / mosaic is generated along with a text file containing the optimized frame positions. De Beers Technologies UK have used a Matlab script, to stitch .ssf (data) files into an image using the optimized frame positions. A Matlab script has also been used to select and analyse appropriate rectangular, square or circular regions of interest from the .ssf data image.

A $\sin \delta$ image and a histogram for the entire NL625-03 sample are shown in **Figure 6**.

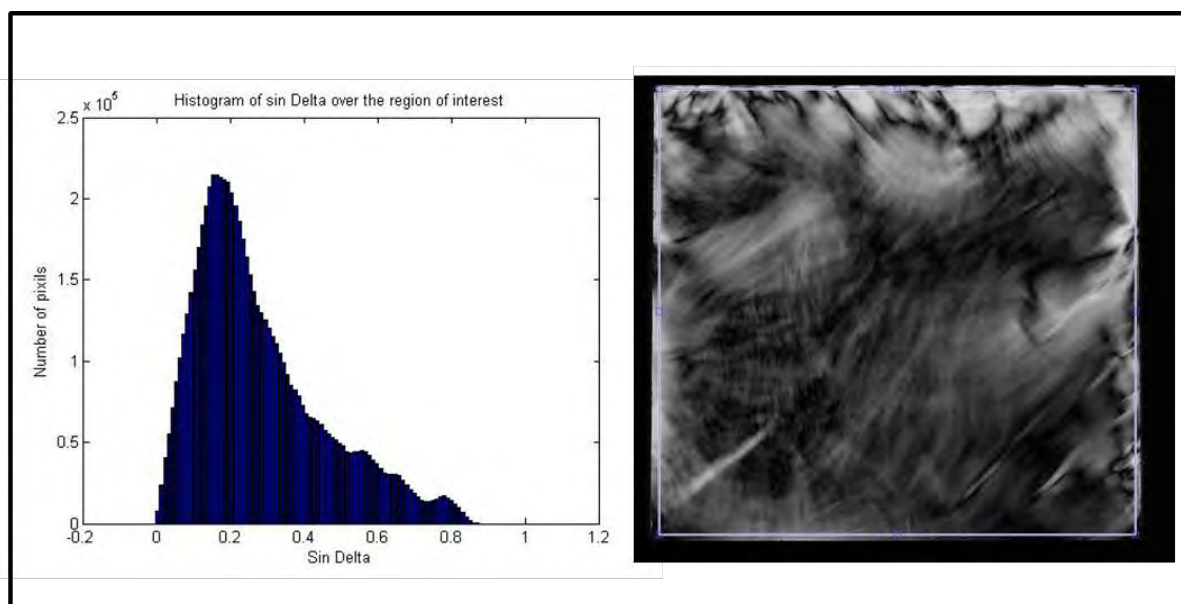


Figure 6: $\sin \delta$ Metripol image of the entire area of NL625-03 and histogram of the $\sin \delta$ values for the region of the sample indicated by the white outlined box in the Metripol image.

Two square regions of the sample image were selected as illustrated in Figure 7. These areas had dimensions of 1.3 mm x 1.3 mm and 2.5 mm x 2.5 mm.

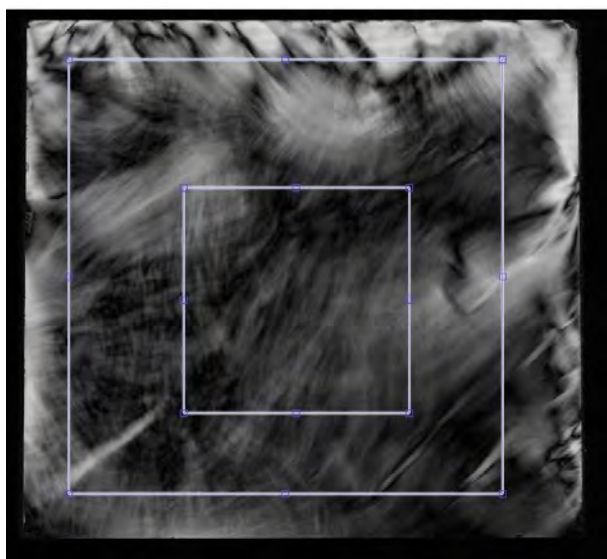


Figure 7: A Sin δ Metripol image of NL625-03 showing square regions of the sample selected for analysis of the distribution of sin δ values. The dimensions of these regions were 1.3 mm x 1.3 mm and 2.5 mm x 2.5 mm.

For the two selected areas, the maximum sin δ value was found (sin δ_{\max}), and hence δ_{\max} was calculated. Using the equation $\Delta n_{\max} = \delta_{\max} \lambda_{\text{meas}} / 2\pi L$, Δn_{\max} was then deduced. The results for NL625-03 are given in Table 5. This table also includes sin δ_{\max} and Δn_{\max} values after selection of the pixels with the 99% and 98% lowest values. Consideration of possible sources of measurement error indicates that the measured sin δ_{\max} values are within 0.02 of the true values and the Δn_{\max} values are within 5×10^{-6} of the true values.

Dimension of selected area (mm)	Sin δ_{\max} (for 100% of the analysed area)	Δn_{\max} (for 100% of the analysed area)	Sin δ_{\max} (for 99% of the analysed area)	Δn_{\max} (for 99% of the analysed area)	Sin δ_{\max} (for 98% of the analysed area)	Δn_{\max} (for 98% of the analysed area)
1.3 x 1.3	0.548	7.46×10^{-5}	0.442	5.89×10^{-5}	0.407	5.39×10^{-5}
2.5 x 2.5	0.834	1.27×10^{-4}	0.628	8.73×10^{-5}	0.588	8.09×10^{-5}

Table 5: sin δ_{\max} and Δn_{\max} values for selected regions over the NL625-03 plate. Values are given for 100% of the analysed area and for 99% and 98% of the analysed area.

4. CONCLUSION

This optical grade plate, sold by Microwave Enterprises, has optical absorption and luminescence characteristics consistent with that of nitrogen-doped single crystal CVD synthetic diamond that has not been annealed to high temperatures after growth. As all material produced by Ila Technologies that we had previously studied had been annealed to high temperature after growth, this study was an interesting opportunity to develop a better understanding of the characteristics of as-grown single crystal CVD synthetic diamond produced by Ila Technologies.

The nitrogen concentration measured for this as-grown sample (118 ppb) is similar to that measured for annealed CVD synthetic diamond samples produced by Ila Technologies. Although the specification of the plates supplied by Microwave Enterprises indicated 0.4 mm thickness, NL625-03 was found to be significantly thicker (0.73 mm).

Laser calorimetry measurements of the absorption coefficient at 1064 nm of NL625-03 were made at Laser Zentrum Hannover. The measured absorption coefficients for these three samples were found to be $0.057(6) \text{ cm}^{-1}$.

Analysis of Metripol images recorded at Warwick University indicates that the plate possesses good optical quality. Only first order birefringence was observed. Over the selected 1.3 mm x 1.3 mm areas the maximum value of $\sin \delta$ and $|\sin \delta|$ was found to be 0.548. Over the selected 2.5 mm x 2.5 mm areas the maximum value of $\sin \delta$ and $|\sin \delta|$ was found to be 0.834. For the 1.3 mm x 1.3 mm area, the maximum Δn value was $7.46(50) \times 10^{-5}$. For the 2.5 mm x 2.5 mm area the maximum Δn was $1.27(5) \times 10^{-4}$.


MICROWAVE ENTERPRISES

Microwave Enterprises
 860 Aviation Parkway, Suite 900
 Morrisville, NC 27560-9204
 PH: (919) 462-1919 Voice 244
 FAX: (919) 462-1927

Quote

Date: 02/24/14
 MWE Quote #: 13-2051
 Ila Quote #: 1314-121

Prepared For:
 Andrey Jarmola
 Department of Physics
 University of California
 366 LeConte Hall #7300
 Berkeley, CA 94720-7300

Description:

The following quotation is for Lab Grown, CVD single crystal diamond plates, produced by Ila Technologies Pte LTD. Products listed are optical grade, single crystal diamond with orientation and size as noted below and small quantity orders.

S/N	DESCRIPTION	ITEM CODE	Quantity	UNIT PRICE (USD)
1	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Optical Grade)	2PCVD3030004N	20	\$101.00
2	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Electronic Grade)	2PCVDEG3030004	20	\$490.00
3	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Electronic Grade)	2PCVDEG5050004	20	\$1,645.00
				Subtotal:
				Bank/Freight/Ins Charges
				GST @0%
				TOTAL

Terms and Conditions

Payment Terms: In Advance
 Delivery Date: 8-10 weeks
 Trade Term: Ex Work (MWE)
 Validity: Quote is Valid for 30 days from date of issue

For Microwave Enterprises, Ltd.

Richard S. Garard, CEO

We look forward to working with you!
www.mwe-ltd.com

**MICROWAVE ENTERPRISES**

Microwave Enterprises
860 Aviation Parkway, Suite 900
Morrisville, NC 27560-9204
PH: (919) 657-0996
FAX: (919) 462-1929

PHYSICS DEPARTMENT
STOREROOM

JUN 10 2014

RECEIVED BY: *[Signature]*

218

Packing Slip

Date: 9-Jun-14
Invoice #: 3086
Customer PO #: BB00361673

Bill To:

Attn: Andrey Jarmola
Company Name: UC Berkeley
Address: 2195 Hearst Ave
City, ST Zip: Berkeley, CA 94720

Ship To:

Attn: Andrey Jarmola
Company Name: UC Berkeley
Address: LeConte Hall RM151
City, ST Zip: Berkeley, CA 94720

SHIP DATE	SHIP VIA	F.O.B	TERMS
6/9/2014	FEDEX	Morrisville, NC	In Advance

QUANTITY	UNIT	DESCRIPTION	ITEM CODE
20	EACH	Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Optical Grade)	2PCVD303004N
		(Total Carat Weight 2.12)	

THANK YOU, FOR YOUR BUSINESS!

www.mwe-ltd.com



MICROWAVE ENTERPRISES

PURCHASE
ORDER

860 Aviation Parkway
Suite 900
Morrisville, NC 27560
USA

Purchase Order No.: 855
Date Issued: 5/7/14

Voice: 919-657-0996
Fax: 919-462-1929

To:

Ila Technologies, Pte Ltd
17 Tukang Innovation Drive
Singapore 618300
Singapore

Phone 65 6555 5825

Fax 65 6555 5830

Ship To:

Microwave Enterprises LTD
860 Aviation Parkway
Suite 900
Morrisville, NC 27560
USA

Delivery Date		Ship Via	Vendor Account No.	Terms	
6/20/14		Fed-EX		Net 30 Days	
Qty	MWE Part #	Vendor Part Number	Description	Unit Cost	Amount
20.00			2PCVD303004N: Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; Optical Grade)	101.00	2,020.00
15.00			- 2PCVDEG303004: Lab Grown diamond plates (3.0mm x 3.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; ELECTRONIC Grade)	490.00	7,350.00
5.00			- 2PCVDEG505004: Lab Grown diamond plates (5.0mm x 5.0mm x 0.4mm; Top/bottom <100>, edges <110>; Basic Polished; ELECTRONIC Grade)	1,645.00	8,225.00
1.00			- 10% Distributor Discount	1,759.50	-1,759.50
Reference Ila Quote: 1314-121 Customer: University of California Berkeley					

TOTAL

\$15,835.50

Authorized Signature: Roger Sprinkle

1. Acceptance of this purchase order constitutes certification that the Supplier will comply fully with all requirements of applicable drawings, specifications and standards, and with Microwave Enterprises Terms and Conditions of Purchase (MWE-LTD Doc. 60003).

2. This purchase order expressly limits to the terms stated herein. Any additional or different terms proposed by the seller are objected and hereby rejected unless documented and signed by authorized MWE-LTD representatives and Seller.



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LAB GROWN DIAMOND MATERIAL

[Properties & Applications](#)[▶ Single Crystal Diamond](#)[Polycrystalline Diamond](#)

Single Crystal Diamond

The single crystal diamond material supplied by Microwave Enterprises is all Type IIa, single crystal diamond. Our manufacturing partner is the industry leader in grown diamond technology and manufacturing capability, Ila Technologies Pte, Ltd., located in Singapore.



High quality single crystal, CVD diamond is used in the following areas:

- Optical Applications - UV, IR and MW Windows, laser optics components
- Mechanical Applications - Precision tooling, surgical tools, wire draw dies, wear parts
- Electronic Applications - Radiation detectors, beam monitors, diodes, quantum computing
- Thermal Applications - Heat spreaders

Property (Actual Values)	Si	GaAs	GaN	SiC	Si3N4	Al2O3	Ila Technologies Diamond
Thermal conductivity (W/mK)	148	55	130	490	15	35	2200
Thermal expansion coefficient at 300K (ppm/C)	2.5-4.2	5.7-6.9	3.2-5.6	4.0-5.8	3.2	7.2-8.3	1.0-3.8
Dielectric constant	11.9	13.1	9	9.66	7.5	9.8	5.7
Electric Breakdown field (kV/cm)	300	400	3000	2200	1000	10000	10000
Electron mobility at 300K (cm ² /Vs)	1500	8500	1000	900	-	-	2200
Hole mobility at 300K (cm ² /Vs)	450	400	350	115	-	-	1600
Saturated carrier velocity (x 10 ⁷ cm/s)	1	1.2	2.2	2	-	-	2.7
Hardness	7	4.5	6	9	8.5	9	10
Optical transparency (nm)	>1107	>870	>365	>384	>248	>354	>236
Radiation hardness (displacement threshold in eV)	15	10	10 to 20	21.8	-	-	43
Bulk modulus (dyn cm ⁻²)	10.2 x 10 ¹¹	7.53 x 10 ¹¹	20.4 x 10 ¹¹	22 x 10 ¹¹	19.5 x 10 ¹¹	22.8 x 10 ¹¹	44.2 x 10 ¹¹



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DIAMOND MATERIAL► [Properties & Applications](#)[Single Crystal Diamond](#)[Polycrystalline Diamond](#)

Properties & Applications

Diamonds are treasured worldwide as gems for their brilliance, beauty and rarity. The mechanical, thermal, and optical properties of diamond are far superior to any other material known to man. As a result, the potential of diamond for industrial applications extend over many market sectors and into almost all areas of science. The problem for broad adoption of diamond material has been the cost of natural diamond and the inferior properties of some synthetic processes.

Microwave CVD diamond has equivalent properties and characteristics as natural diamond, but with repeatable consistent and eco friendly processing. MWE provides the US market with CVD diamond material produced by Ila Technologies, Pte. Ila Technologies host the largest CVD diamond manufacturing facility in the world, where they have transitioned from producing type Ila rough diamond for the gem market to similar material, produced and finished for the industrial and scientific communities.

Microwave Enterprises is pleased to have a relationship with Ila Technologies and the corresponding ability to offer their diamond materials to our customers.

2atechnologies.com



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ABOUT MWE

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Microwave Enterprises History

MWE was formed following the spinout of the Lambda Plasma Division of Lambda Technologies, Inc. The founders and principles of MWE have over 25 years experience in the development of CVD equipment and processes for lab grown diamond. The microwave equipment products of MWE are based on patented technology exclusively licensed from Michigan State University. Microwave CVD products based on this technology were the first to be moved from the laboratory into production of lab grown diamond in the late 1980's and it was the first technology to incorporate 915MHz into the diamond CVD process. Today, MWE produces a complete range of fully automated microwave CVD

equipment. Our CVD equipment and process technology is currently in use for the following applications:

- Polycrystalline Diamond Films
- Nano and Ultrananocrystalline Diamond films
- Single Crystal Diamond material

In 2013, the company teamed with one of our customers and the largest producer of lab grown diamond materials in the world, IIA Technologies. Under that collaboration, MWE now distributes and sells lab grown diamond materials in the North America market place. The focus for diamond material sales is development and production applications in the scientific and industrial markets and support of research for advanced applications.

The combination of equipment and process experience plus a marketing collaboration with the largest CVD diamond manufacturer, places Microwave Enterprises in a unique position to service and support the diamond community in all areas of research as well as for the legacy industrial diamond applications.

